VEMBER, 1957

RUBBER WORLD

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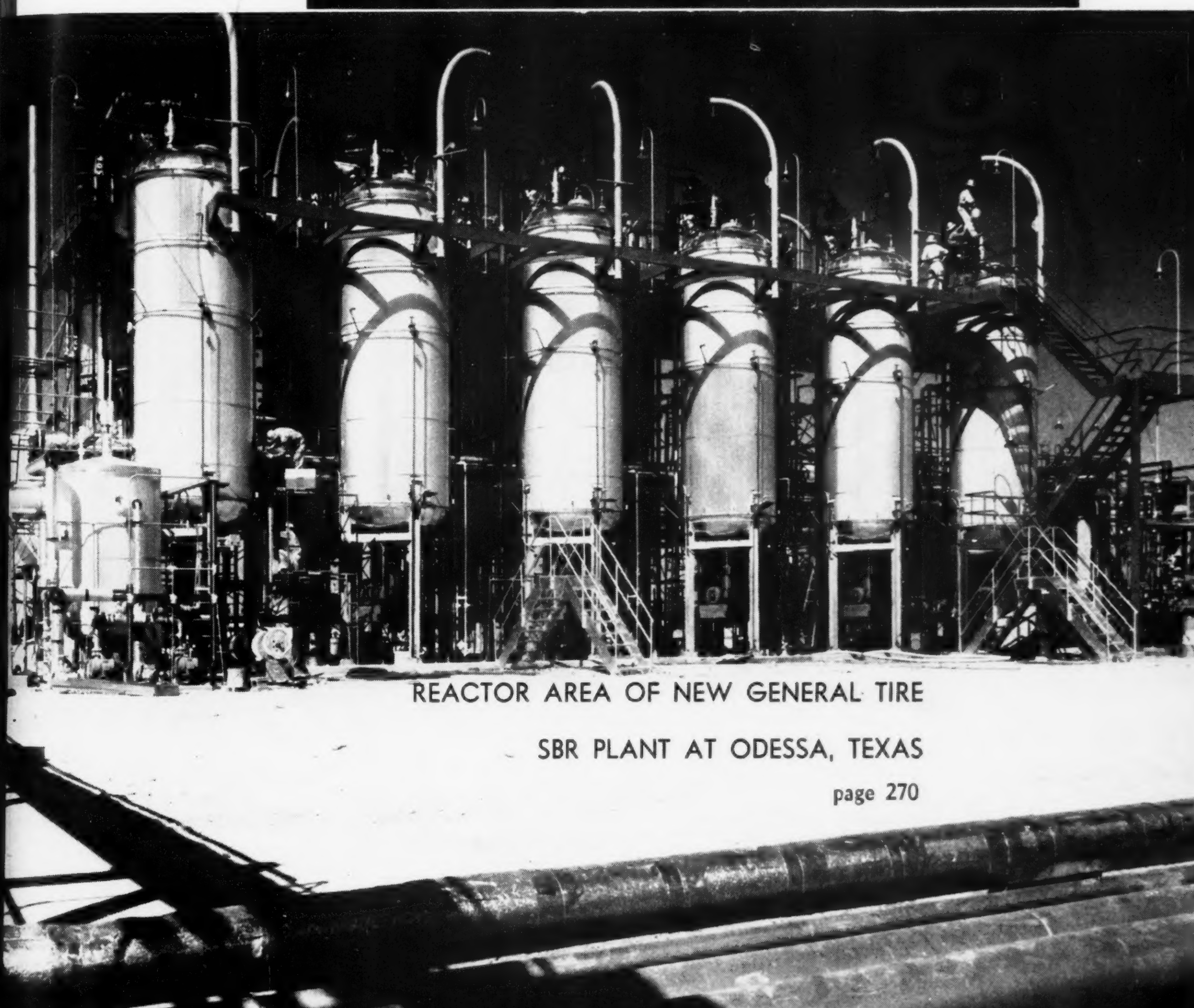

REACTOR AREA OF NEW GENERAL TIRE

SBR PLANT AT ODESSA, TEXAS

page 270

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BLICATION

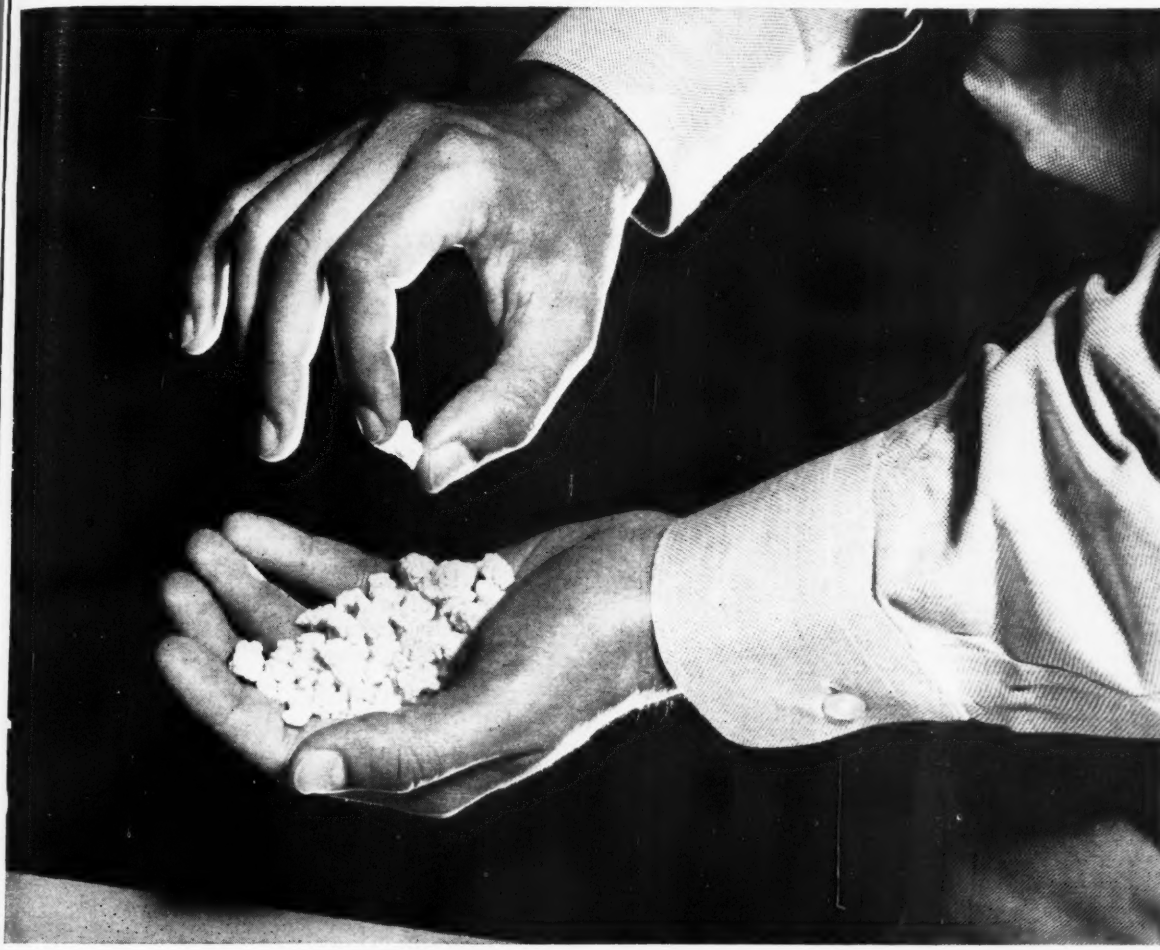
THE TOWER OF BABEL

By Arthur W. Carpenter, page 241

RUBBER WORLD, November, 1957, Vol. 137, No. 2. Published monthly by BILL BROTHERS PUBLISHING CORP., Office of Publication, 1309 Noble Street, Philadelphia, Pa., with Editorial and Executive Offices at 386 Fourth Avenue, New York 16, N. Y., U. S. A. Entered as Second Class Matter at the Post Office at Philadelphia, Pa., under the act of March 3, 1879. Subscription United States $5.00 per year; Canada $6.00. All other countries $7.00. Single copies 50c. Address Mail to N. Y. Office.

News about

B.F.Goodrich Chemical *raw materials*



simplify processing and rubber addition

with new Good-rite 2057 in "popcorn" form

NEW Good-rite 2057, in dustless, free-flowing "popcorn" form, is a ready-to-use, equally proportioned master batch of cold GR-S and Good-rite 2007 (RESIN 50). Its unique form permits processing as received.

It speeds weighing, handling and compounding — rapid "popcorn" breakdown shortens banbury and mill mixing cycles. Good-rite 2057 also ends the loss of separately-used reinforcing resin during handling and in worn equipment.

When Good-rite 2057 is compounded with GR-S, the vulcanizates exhibit a very complete range of physical properties, including: good hardness, low specific gravities, improved abrasion and flex characteristics, good tear and electrical properties.

Applications for Good-rite 2057 include shoe soles, floor tiling and hard extruded items. For further information on Good-rite 2057, write Dept. HN-11, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

Good-rite
CHEMICALS

B.F.Goodrich Chemical Company
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VOLUME 137, NUMBER 2 NOVEMBER, 1957

CONTENTS

Cover Photo: Courtesy of The General Tire & Rubber Co.

The opinions expressed by our contributors do not necessarily reflect those of our editors.

FEATURE DEPARTMENTS

Philblack* saves you money!

With four different Philblacks to choose from, each offering special advantages in its own price range, you can select the one which gives the qualities you need at the lowest cost.

Easy-processing Philblacks also save you *time and trouble* ... by helping you speed up production and turn out better products with fewer rejects. Write for more information or consult your Phillips technical representative.

*A trademark

LET ALL THE PHILBLACKS WORK FOR YOU!

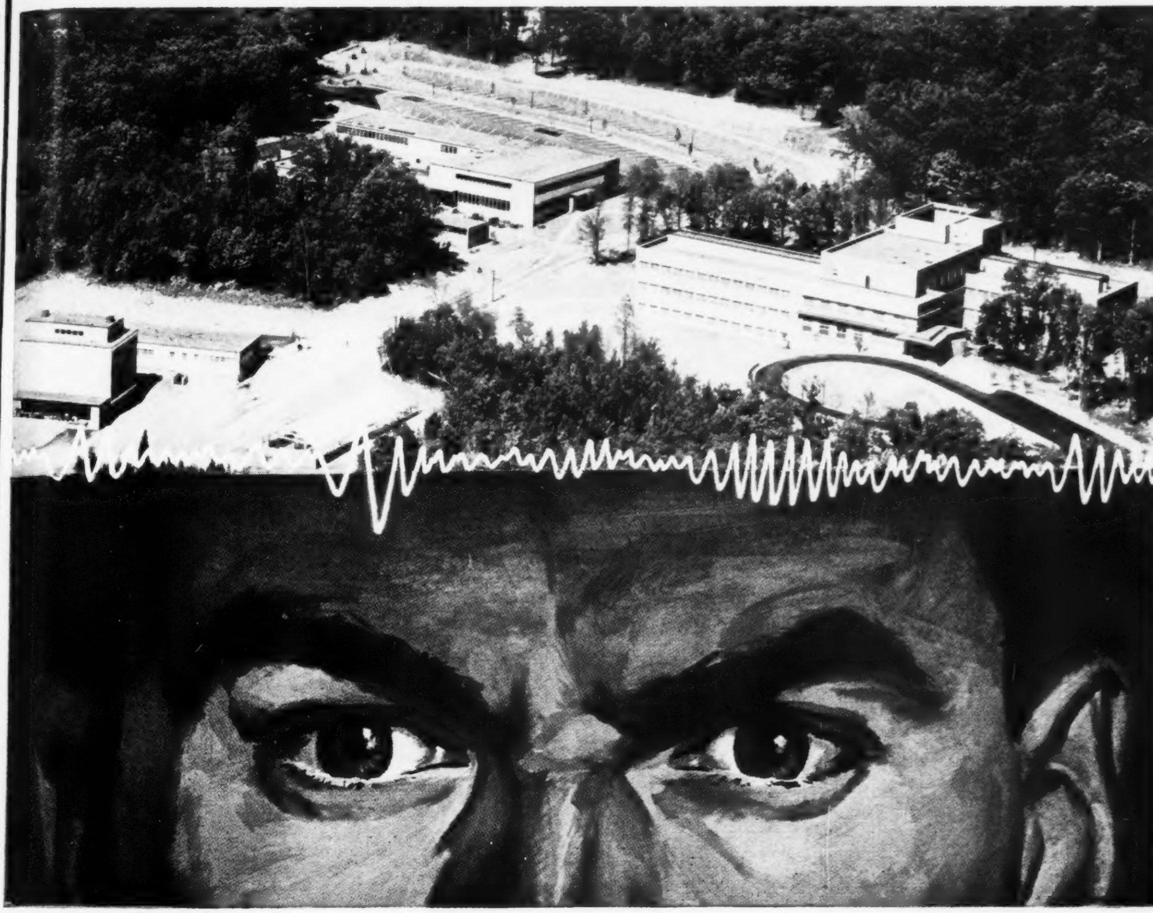
A — **Philblack A, Fast Extrusion Furnace Black.** Excellent tubing, molding, calendering, finish! Mixes easily. Disperses heat. Non-staining.

O — **Philblack O, High Abrasion Furnace Black.** For long, durable life. Good conductivity. Excellent flex life and hot tensile. Easy processing.

I — **Philblack I, Intermediate Super Abrasion Furnace Black.** Superior abrasion. More tread miles at moderate cost.

E — **Philblack E, Super Abrasion Furnace Black.** Toughest black yet! Extreme resistance to abrasion.

PHILLIPS CHEMICAL COMPANY, Rubber Chemicals Division, 318 Water St., Akron 8, Ohio. **District Offices:** Chicago, Providence and Trenton. **West Coast:** Harwick Standard Chemical Company, Los Angeles, California. Warehouse stocks at above points and Toronto, Canada. **Export Sales:** 80 Broadway, New York 5, N. Y.



Here, creative minds will shape the future

Yes, here in the new Research Center of United States Rubber Company the probing minds of chemists and other scientists will find the ideal environment for conceiving new ideas...the finest facilities for bringing them into reality. Located on a 100-acre tract in suburban Wayne Township, New Jersey, the Center is a concrete symbol of the basic importance of Research in this company's past, present and future.

Significantly, at least 25 of U. S. Rubber's major product lines have been developed within the past twelve years.

As the Chemical Division of U. S. Rubber, Naugatuck Chemical continues to contribute a generous portion of new and improved products...such as its compounding method for greatly increasing the ozone resistance of its Paracril® nitrile rubbers.

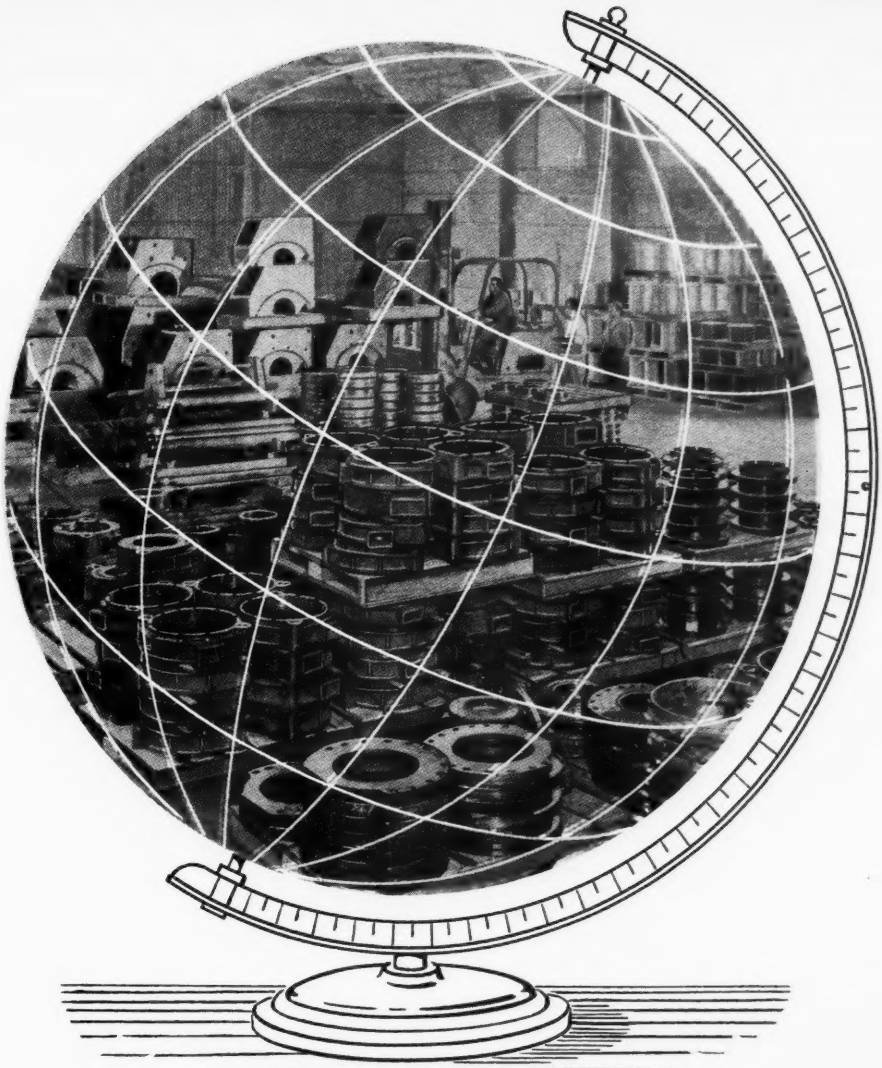
Such developments stem not only from our research laboratories at Naugatuck, but also from Naugatuck's agricultural research facilities at Bethany, Connecticut, and the laboratories of our Canadian affiliates, Naugatuck Chemicals and Dominion Rubber Company, Ltd. Now, Naugatuck's research will be substantially augmented—and perhaps channeled in radically new directions—by the more fundamental research carried on at the new Research Center.

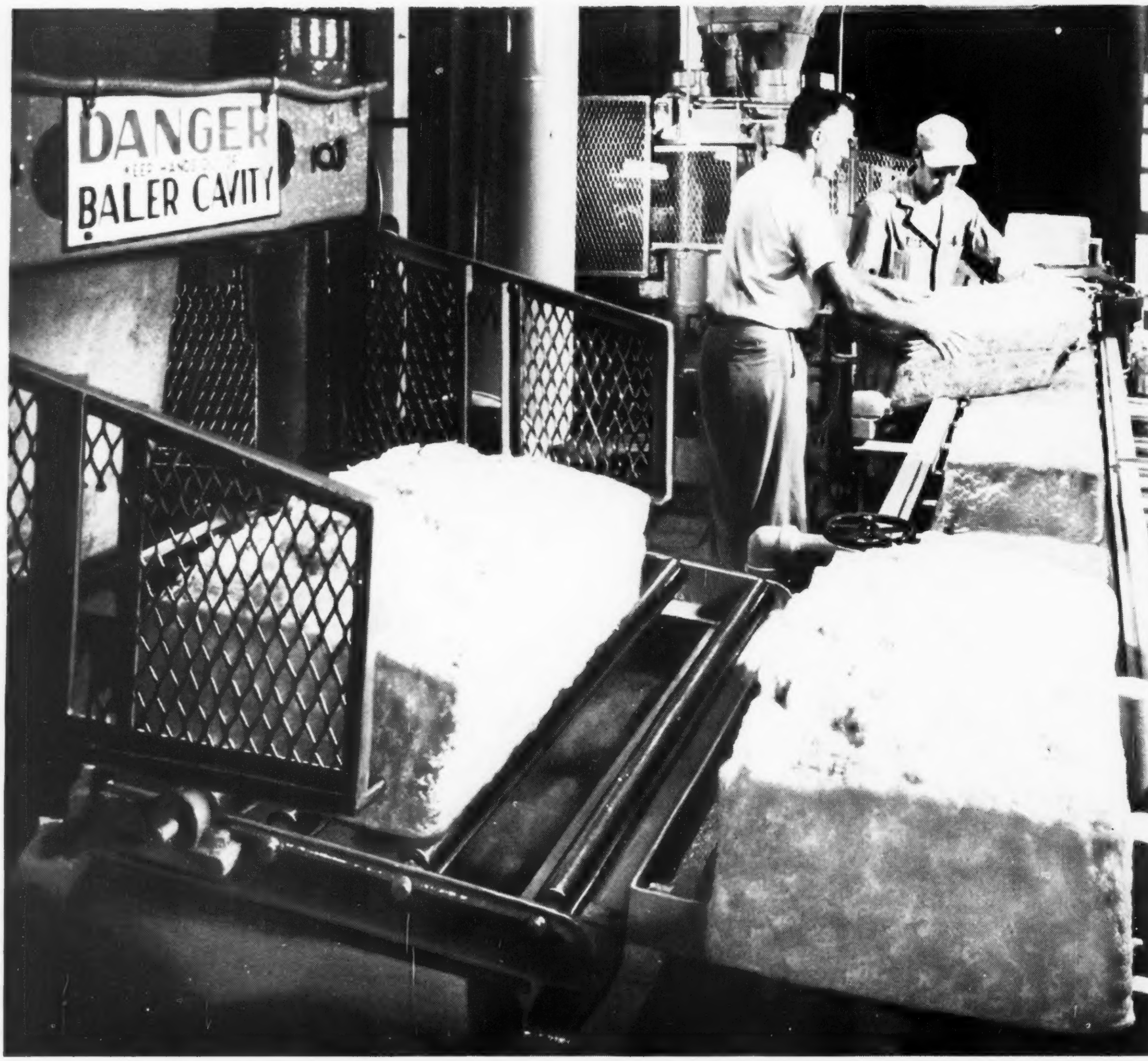
In the future, even more than in the past, look for the name Naugatuck to identify *the newest and the finest* products in their respective fields!

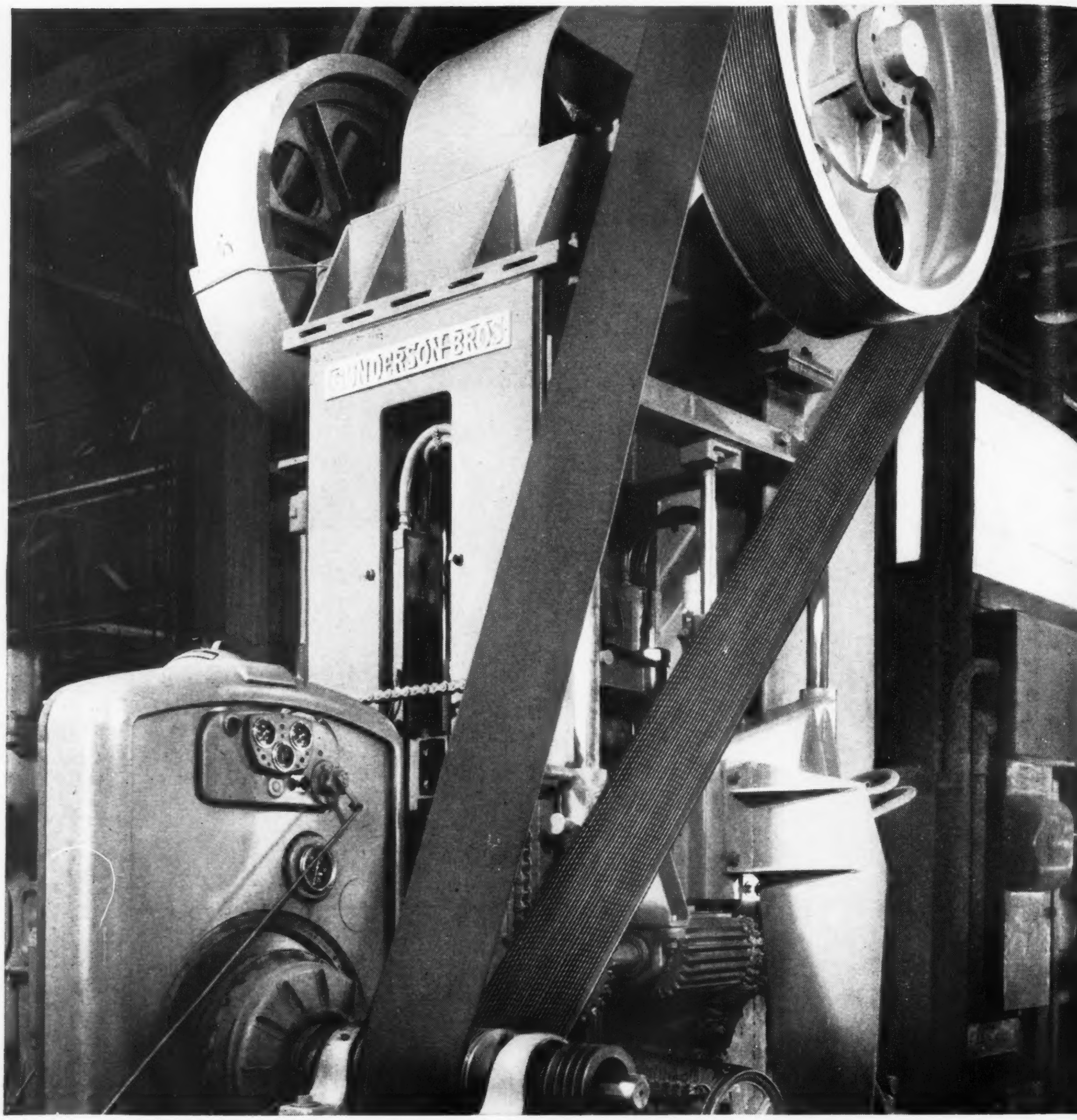
Naugatuck Chemical

Division of United States Rubber Company, Naugatuck, Connecticut

Rubber Chemicals · Synthetic Rubber · Plastics · Agricultural Chemicals · Reclaimed Rubber · Latices · CANADA: Naugatuck Chemicals Division, Dominion Rubber Co., Ltd., Elmira, Ontario · CABLE: Rubexport, N.Y.




DANGER
BALER CAVITY


GUNDERSON-BROS.

COOLER MIXING

The exclusive advanced design of the SHAW Intermix Rotor Assembly is not only a guarantee of exceptional strength and durability, but provides greatly increased cooling properties. Both the chamber bodies and ends are arranged for steam heating or water cooling. The rotor design avoids large masses of compound, and if desired the temperature of processed stock can be maintained at a low figure, thus a wider temperature range is obtained.

● *This is only one outstanding feature of SHAW Intermix design; please send for fully illustrated brochure.*

Francis Shaw & Co. Limited supply a unique range of Plant for the Rubber and Plastic Industries. Enquiries are invited for Layout suggestions and arrangements.

- **Low maintenance cost**
- **Roller bearings**
- **Cooler mixing**
- **Superior design**

Quality engineering for quantity production

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P4416

Good compression—is one advantage of polyether-based polyurethane foams made from new NIAX Diol PPG 2025. In addition, it helps give foams that are lower in cost than other types of flexible foams.

Now—Lowest cost Polyurethane Foams

from NIAX Diol PPG 2025

TRADE-MARK

(POLYPROPYLENE GLYCOL 2025—RESIN GRADE)

Lowest cost you say? Right! Polyether-based foams, from NIAX Diol PPG 2025 are lower in cost than other types of flexible foams. Therefore, if you are making prepolymer or foam, you'll want to take advantage of NIAX Diol PPG 2025. This new material assures uniform properties of the prepolymer or foam—from batch to batch.

In addition to imparting good compression—deflection characteristics, resilience, and recovery properties, field tests show NIAX Diol PPG 2025 gives the added advantage of excellent humid-aging.

Union Carbide Chemicals Company's NIAX Diols PPG 425, 1025, and 2025 also are bases for other types of flexible and rigid urethane foams.

For samples and specification data on these products, write Union Carbide Chemicals Company, Room 328, Department H, 30 East 42nd Street, New York 17, New York.

In Canada: Carbide Chemicals Company, Division of Union Carbide Canada Limited, Montreal.

UNION CARBIDE

CHEMICALS

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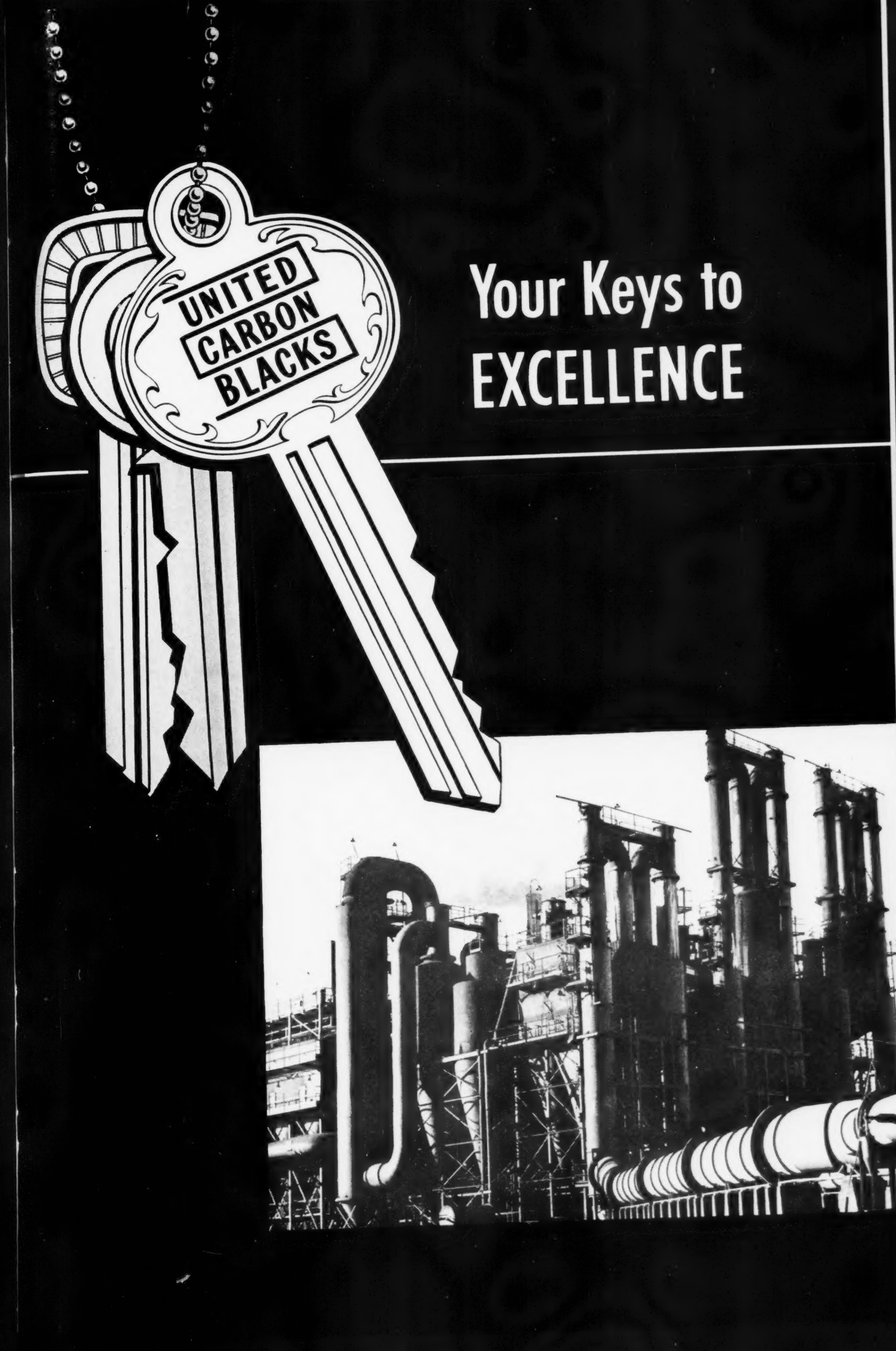
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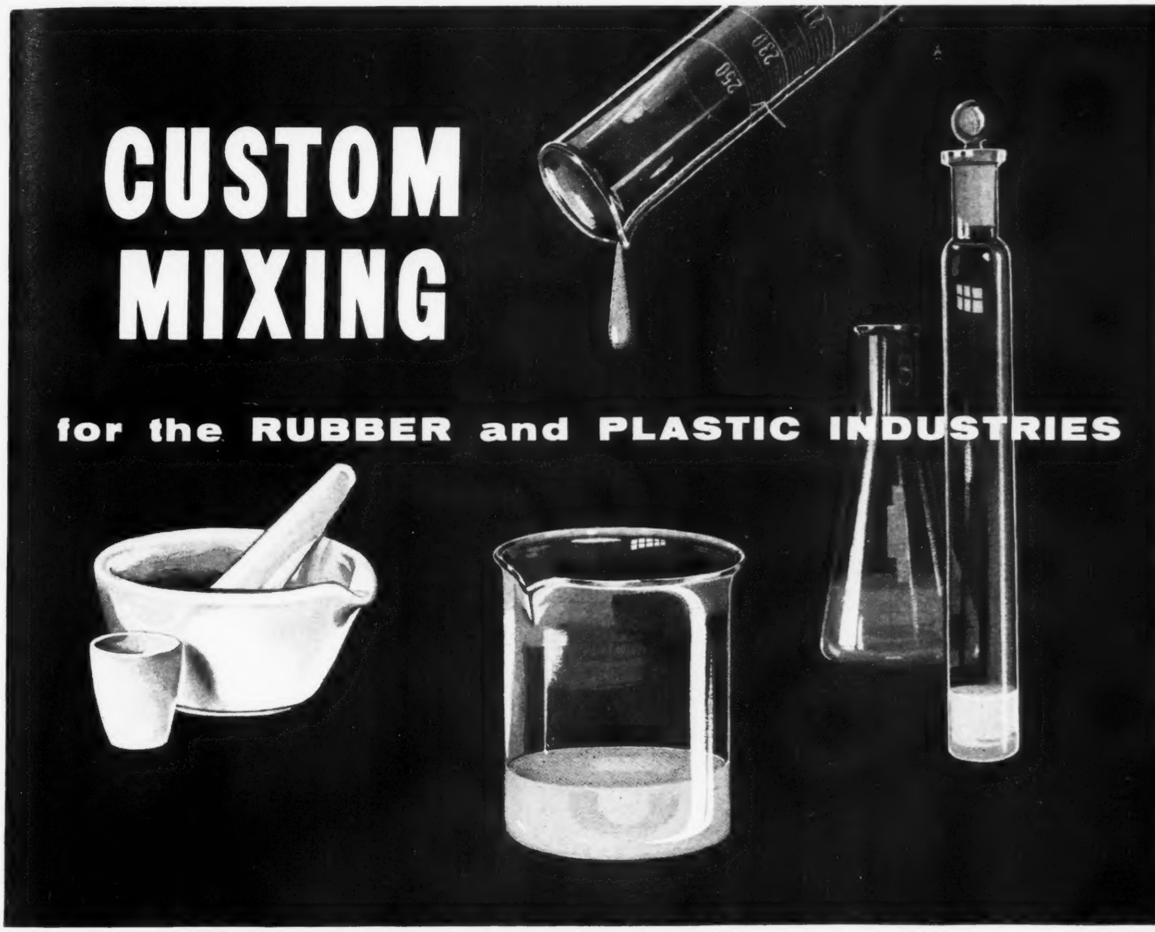
CARBON
BLACKS
Your Keys to
EXCELLENCE



Depend On Us For Critical Milling And Compounding To Protect The Reputation Of Your Product

Through the use of our service you can effect savings by:

- **ELIMINATING CAPITAL COST OF MACHINERY**
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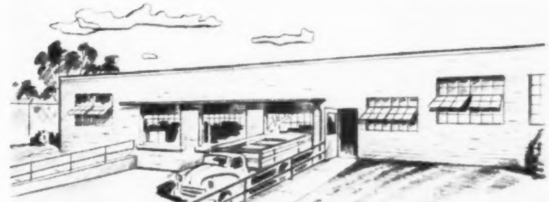
Write, wire or telephone our Barberton, Ohio plant for complete information concerning your milling and compounding problems.



CUSTOM MIXING ADDITION IN BARBERTON, OHIO

MIDWEST RUBBER RECLAIMING CO.

CUSTOM MIXING DIVISION • BARBERTON, OHIO

4 big advantages make NRM Rubber EXTRUDERS

NRM 10"
RUBBER EXTRUDER

...THE MOST TIME-SAVING, COST-CUTTING MACHINES IN THE INDUSTRY:

- LOW INITIAL COST
- LOW MAINTENANCE
- HIGH PRODUCTION
- L-O-N-G LIFE

2691

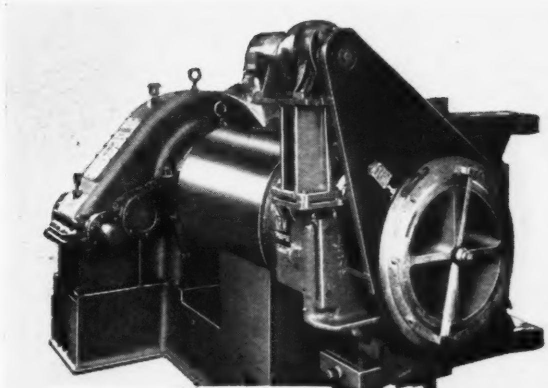
THE NRM RUBBER EXTRUDERS shown here are representative of the **full line** available to the industry in sizes from $1\frac{1}{2}''$ to $12''$. Larger Extruders to meet special requirements are produced on order. While many advanced design and construction features contribute to the four **big** advantages of NRM Rubber Extruders, the following are of special importance:

SIMPLICITY — Practical, uncomplicated design makes NRM Extruders extremely dependable and easy to operate. Compact construction makes them space-saving.

VERSATILITY — A variety of die heads make possible tube, tread, slab and other types of extrusions with a single machine, further increasing the production range of NRM Extruders.

DURABILITY — NRM Extruders are built to "stand the gaff" of mechanical rubber goods production . . . oversize thrust and radial bearings, heavy heat-treated steel cut herringbone gears, corrosion-resistant cylinder liners and hardened surface feed screws are a few of the heavy-duty construction features that assure a long life of high production at minimum cost for maintenance.

It's easy to spend more for a rubber extruder than the low first cost of an NRM, but difficult to equal the NRM quality features that help manufacturers increase profit on rubber goods production. If you are planning to purchase rubber extruders, contact us. We'll be happy to assist you in your planning, and recommend the type and size NRM Extruders to meet your requirements most efficiently and economically.



NRM $8\frac{1}{2}''$ RUBBER STRAINER

Quick-opening air-operated die heads, hinged strainer plates, undercut feed boxes . . . save time, cut costs in stock preparation.

NRM $4\frac{1}{2}''$ MIL-X-TRUDER®

Turns warm-up time to production time by eliminating the need of a warm-up mill. Uses either extended smooth-bore, or fluted cylinder liners. Ideal for extruding Silicone compounds.

Write for these NRM Bulletins

- RUBBER EXTRUDERS
- MIL-X-TRUDERS
- RUBBER STRAINERS
- MIL-STRAINERS
- EXTRUDER DIE HEADS

NRM $1\frac{1}{2}''$ RUBBER EXTRUDER

Never an idle moment for this machine . . . when not in laboratory work, it pays its way in actual production of small cross-sections. Materials, design and construction are the quality equal of any **big** NRM Extruder.

2691

NATIONAL RUBBER MACHINERY COMPANY

NRM

Creative Engineering

General Offices and Engineering Laboratories: 47 W. Exchange St., Akron 8, Ohio
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WEST: S. M. Kipp, Box 441, Pasadena 18, Cal.
MID-WEST: National Rubber Machinery Co., 5875 N. Lincoln Ave., Chicago 5, Ill.
EXPORT: Gillespie & Company, 96 Wall St., New York 6, N. Y.

(formerly Tenamene 30 and 31)

Eastozone

cuts cost of ozone protection

Rubber products require safeguards against the serious deteriorating effects of ozone. Yet, you may be spending more than you need spend for this protection.

Eastozone—Eastman rubber antiozonants—guard against ozone attack more effectively at *lower cost* than do other types of commercially available antiozonants.

By using Eastozone in rubber recipes, compounders often can cut antiozonants concentration in half and get equal ozone protection. measured by static or dynamic ozone exposure tests. At current prices, this lower concentration can mean a saving of as much as 20¢ on your antiozonant dollar.

Eastozone antiozonants are easily incorporated into the rubber formula during processing. They slowly exude to the surface of the finished rubber product, affording long-lasting protection against checking and cracking caused by atmospheric ozone.

For economical and effective ozone protection, specify Eastman antiozonants for your rubber recipes. Ask your Eastman representative today for samples of Eastozone 30 and Eastozone 31 for evaluation by your laboratory staff, or write to Eastman Chemical Products, Inc., subsidiary of Eastman Kodak Company, Kingsport, Tennessee.

Chemical Description of Eastman Antiozonants

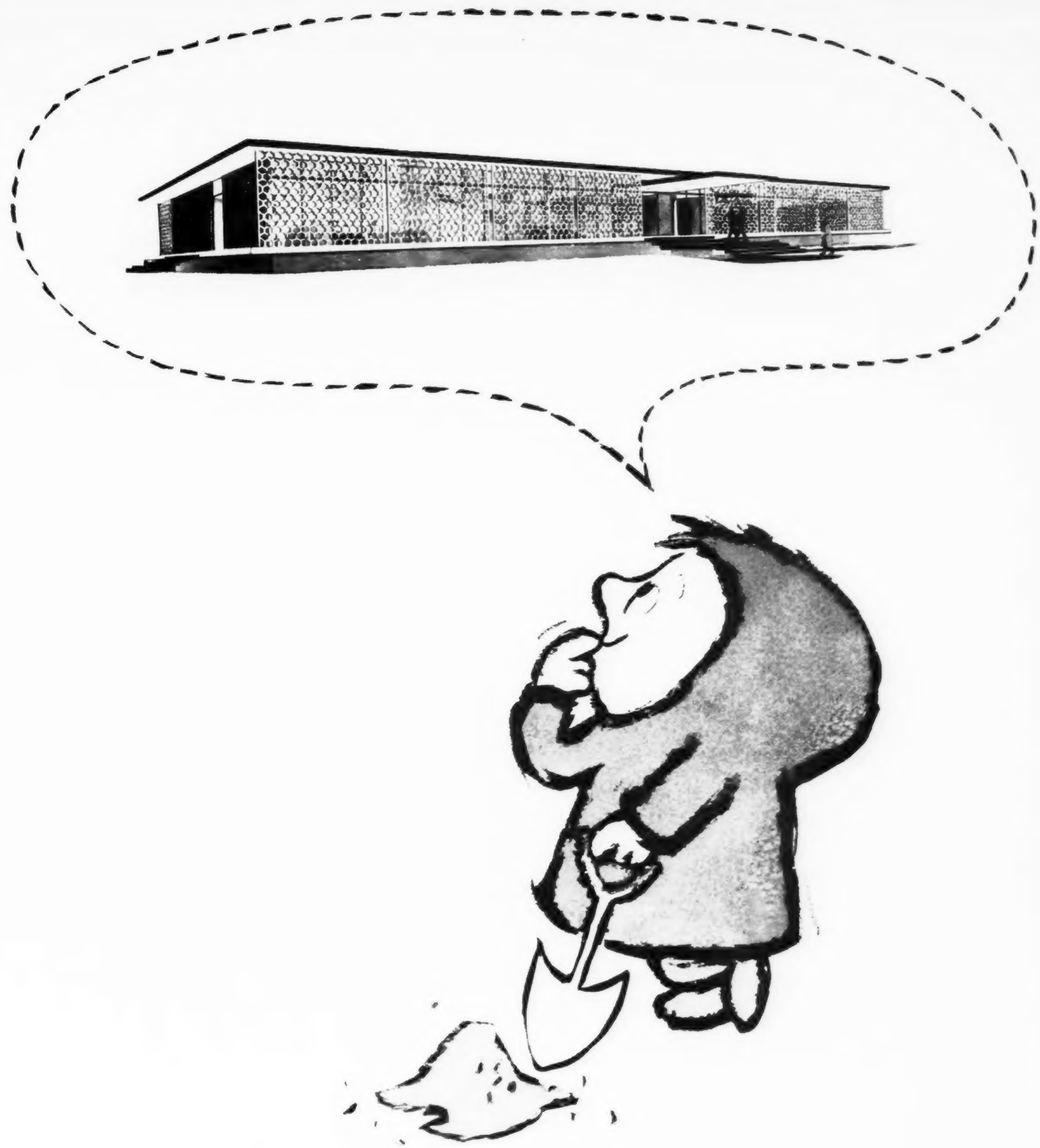
Eastozone 30	N,N'-di-2-octyl p-phenylenediamine
Eastozone 31	N,N'-di-3-(5-methylheptyl) p-phenylenediamine

(formerly Tenamene 30 and 31)

Eastozone **Eastman Rubber Antiozonants**

SALES OFFICES: Eastman Chemical Products, Inc., Kingsport, Tennessee; New York City; Framingham, Massachusetts; Cincinnati; Cleveland; Chicago; St. Louis; Houston. **West Coast: Wilson Meyer Co.,** San Francisco; Los Angeles; Portland; Salt Lake City; Seattle.


VINYL COMPOUNDS
Custom Mixed by
CARY CHEMICALS
Now Available as:
PELLETS · DICED · POWDER



COPO®

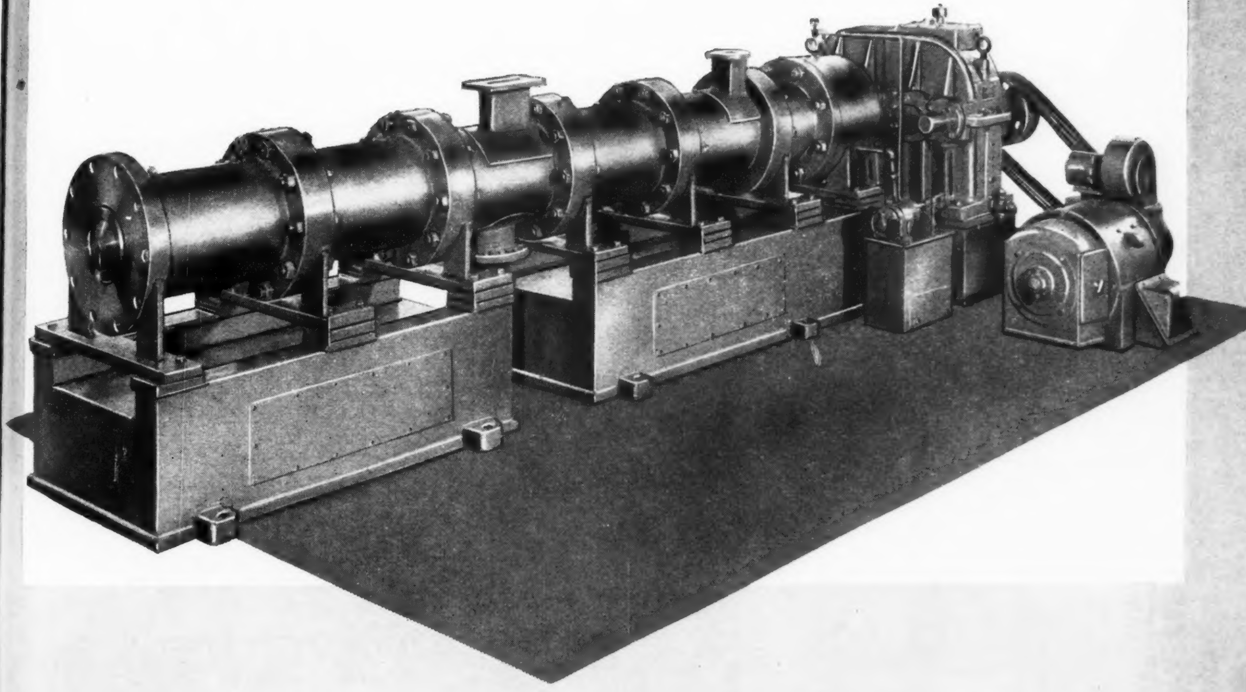
means pioneering in cold rubber...

. . . pioneering evidenced by groundbreaking for our new research building which will provide facilities for a greatly expanded program to furnish you with NEW AND IMPROVED COPO PRODUCTS.

uniformity · well-packaged · high quality · good service

COPOLYMER RUBBER & CHEMICAL CORPORATION · BATON ROUGE 1, LOUISIANA · COLD RUBBER SPECIALISTS

Specials... THAT'S US



The 8" extruder illustrated fits into a special processing line. Custom designed for a large chemical company, the extruder had to be designed to coordinate with existing processing, blending and mixing facilities.

Extruders for standard operations can be off-the-shelf models but new processes, new products, new ideas require specific designs. For example, in the processing of polyethylene, we developed special extruders for simultaneous hot and cold feeding. In the fields of foamed plastics, polystyrene, polyethylene, the vinyls, we have designed many individual extruders for processing, blending, reclaiming and devolatilizing.

Most new ideas for special equipment originate in shirt-sleeve sessions with a company's production and engineering personnel. They know their process requirements. We translate these specifications into machines tailored to the job.

If you are working on new ideas in either plastics or rubber, H & K can be of assistance. We have specialized knowledge of these fields and can design a complete plant, a special process or an individual machine. We also have complete engineering service.

YOUR INQUIRY

For prompt response, please address your inquiry to:

Hale and Kullgren, Inc.
613 E. Tallmadge Ave. Akron, Ohio

Sales and Engineering by

HALE and KULLGREN, INC.

P. O. Box 1231 · AKRON, OHIO

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THE AETNA-STANDARD ENGINEERING CO., PITTSBURGH, PA.

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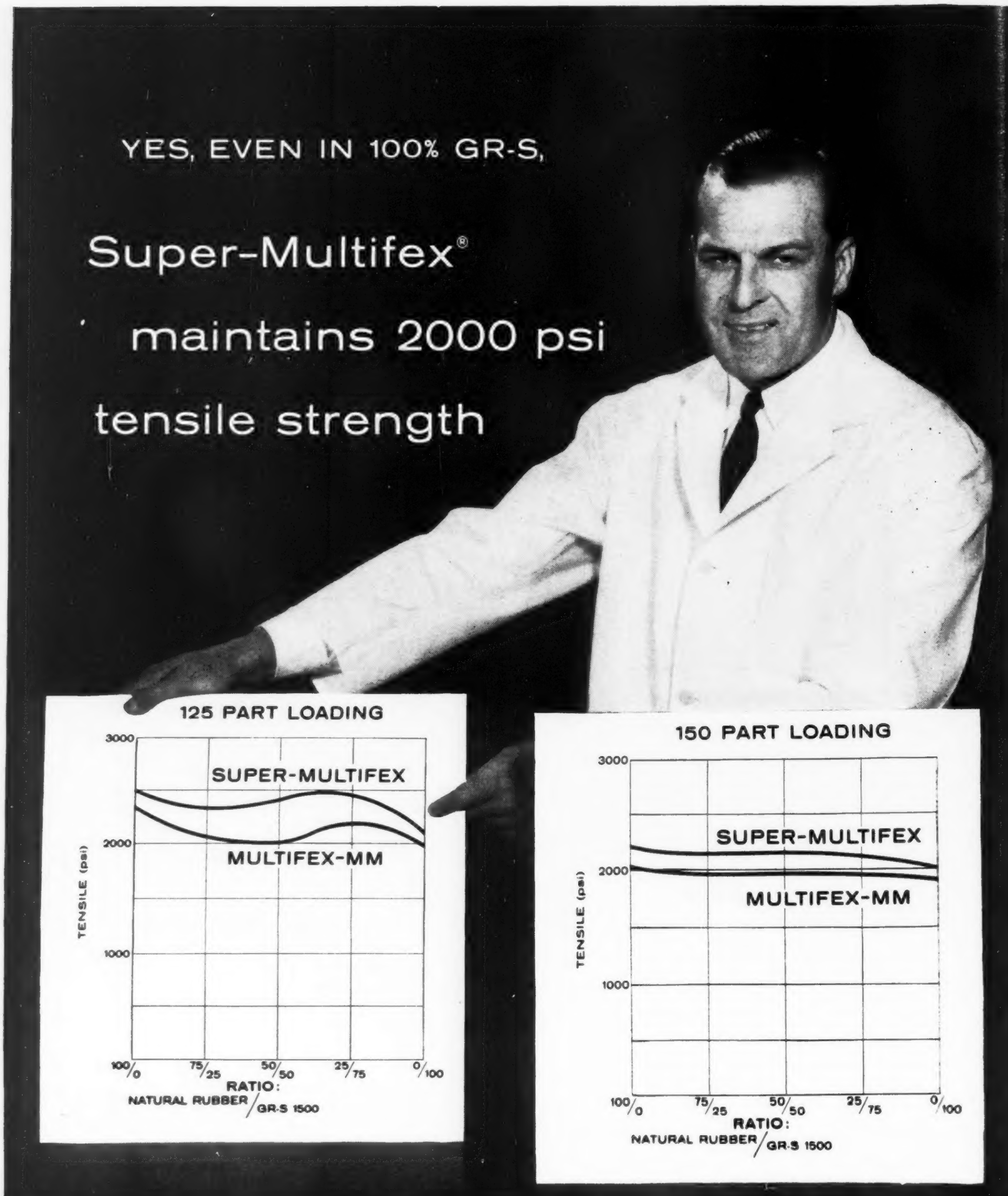


Now you can use DIAMOND Super-Multifex in your GR-S compounds—even in those with *no* natural rubber—and be sure you're getting at least 2000 psi tensile strength.

Contrast the performance of Super-Multifex and Multifex-MM® with the much lower tensiles normally obtained in compounds containing ground limestone.

DIAMOND's ultra-fine Super-Multifex (.03 micron) precipitated calcium carbonate has extremely uniform particles, coated to aid dispersion, mixing and processing.

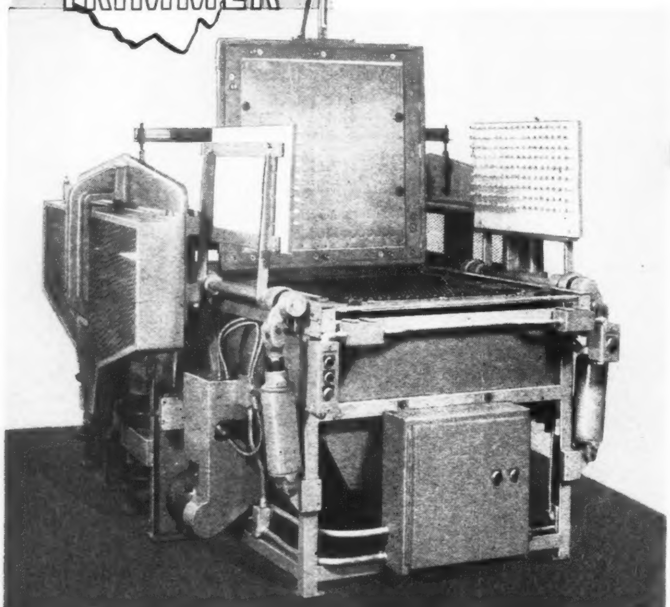
Multifex-MM, also shown on the graphs, is an uncoated, ultra-fine (.04-.06 micron) precipitated calcium carbonate. You can see how it consistently reinforces GR-S, too.

Try either Super-Multifex or Multifex-MM in your next batch to improve physical properties. Call your DIAMOND Representative today. He can supply information and technical help on these and other high-grade calcium carbonates. Or write DIAMOND ALKALI COMPANY, 300 Union Commerce Bldg., Cleveland 14, Ohio.

Diamond Chemicals

CHECK these 5 typical examples of GREAT SAVINGS IN PRODUCTION COSTS

FEMCO
AUTOMATIC
TRIMMER
FOR MOLDED RUBBER GOODS



. . when trimming molded rubber goods on FEMCO'S Automatic TRIMMER!

26 Cavity
ACCELERATOR PEDAL
with Centerline Flash
1600 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $475

45 Cavity
Open Cutting
BRAKE PEDAL
5,000 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $225

64 Cavity
SQUARE CASTER CUPS
5,000 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $200

50 Cavity
ROUND CASTER CUPS
4,000 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $150

100 Cavity
CYLINDER BOOT
7,200 Pieces
Per Hour
(Approx. Production)
Die Cost Approx. $250

HERE are five examples (and we can give you many more) of how FEMCO's New Automatic Trimmer for Molded Rubber goods turns production losses into profits! Now high speed trimming production hour after hour is yours in an operation that takes practically all the manual work out of the job! Write, wire or call us, let us tell you how we can help you solve your particular trimming cost problem.

1917 40th ANNIVERSARY 1957

The FALLS ENGINEERING AND MACHINE CO.
CUYAHOGA FALLS, O.

FEMCO builds special machines for cutting, trimming, splitting all the new plastics and foams, including urethanes. Write for details, tell us what you need.

Dow Chelating Agents

now available

in a new dry form

VERSENE Fe-3
and
VERSENE

Snow-White Flakes

From a production or handling standpoint alone, you probably can enumerate a number of reasons to support your preference for chelating agents in a more easily handled form. Dow recognized your need.

Research was conducted on Versene® Fe-3 and Versene to obtain a dry form to meet this need. As a result, we are now able to supply you with Versene Fe-3 and Versene not only in the familiar liquid form but also in the new snow-white flake form.

Snow-white Versene Fe-3 flake and Versene flake enable you to utilize chelating agents more efficiently because they are light, free-flowing, and can be more compactly packaged.

Your order for Versene Fe-3 and Versene in flake form can be processed immediately, for we have a ready supply on hand. Any question you may have on the properties and applications of the flakes may be answered by our technical personnel. Write to Organic Chemicals Sales, THE DOW CHEMICAL COMPANY, Midland, Michigan. Dept. CA 1310D.

YOU CAN DEPEND ON DOW

NEW! C

Be sure the polymer you use contains CIRCOSOL NS

SUNOCO

Su
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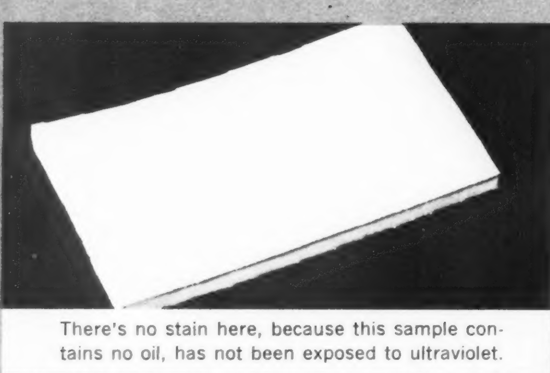
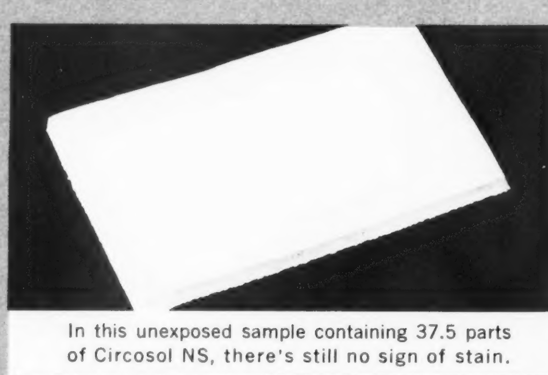
UNEXPOSED TO ULTRAVIOLET



There's no stain here, because this sample contains no oil, has not been exposed to ultraviolet.



In this unexposed sample containing 37.5 parts of Circosol NS, there's still no sign of stain.

!CIRCOSOL NS

combines easy processing with outstanding non-staining properties

Sunoco's newest rubber process aid is compatible with butadiene-styrene polymers and natural rubber

Sunoco's new CIRCOSOL NS offers long-sought possibilities for oil-extending light-colored rubbers and polymers. And here's the big news: Extended with CIRCOSOL NS, polymers retain optimum processibility.

CIRCOSOL NS is shown at the left, photographed in its own natural pale color. This highly refined naphthenic oil, non-volatile for high-temperature processing, gives excellent low-temperature properties to your finished products. This advantage, combined with the outstanding non-staining properties of CIRCOSOL NS, adds up to the ideal low-cost extender for the production of light-colored rubber goods.

For test samples, technical bulletin or prices, see your Sun representative, or write to Dept. I-8.

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY PHILADELPHIA 3, PA.

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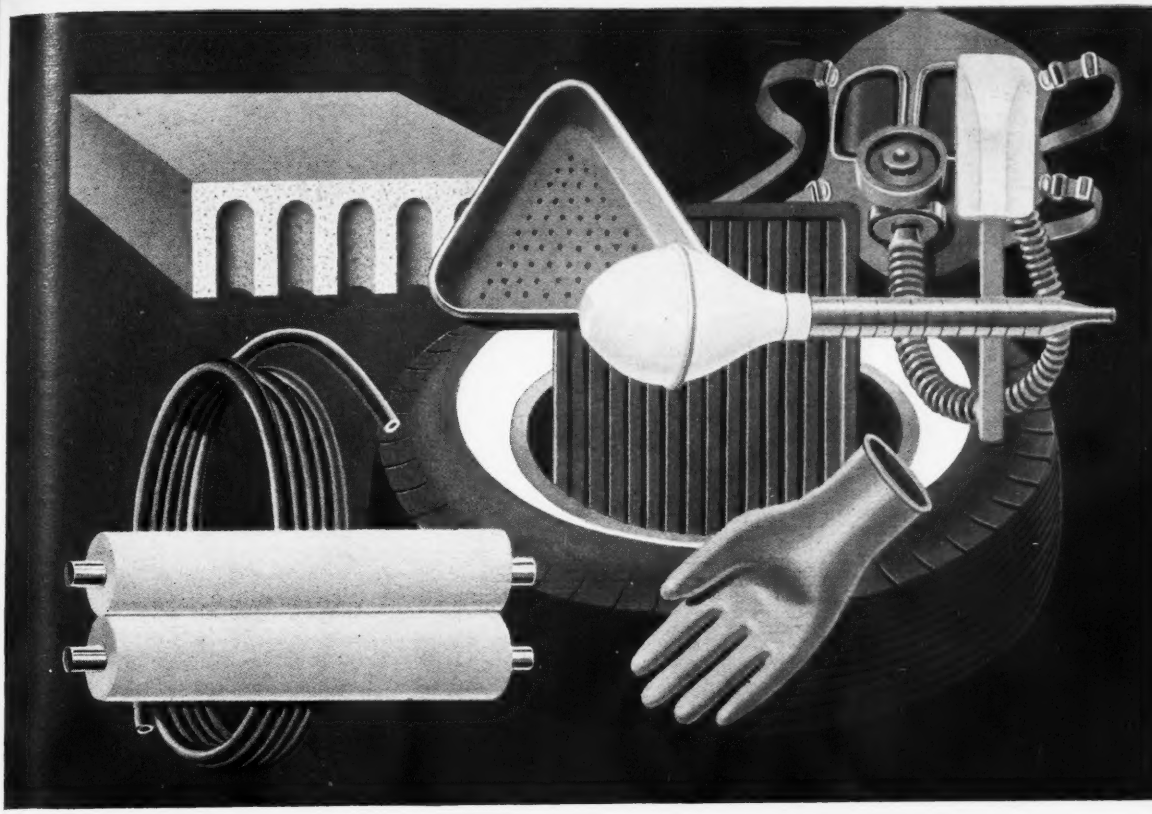
EXPOSED TO ULTRAVIOLET

After exposure to ultraviolet at 150 F for 24 hours, this oil-free vulcanizate shows very little stain.

This sample with 37.5 parts of Circosol NS looks virtually the same as sample with no oil at all!



You'll find Nevastain B is a superior non-staining antioxidant at lower cost

Nevastain B is an excellent non-staining, non-discoloring antioxidant developed especially for rubber manufacturers who prefer an antioxidant in the flaked form for greater convenience in compounding operations. It is shipped in sturdy 50-pound bags for easy weighing and handling. *In some instances, Nevastain B can replace products three times higher in cost,* and it has proved itself to be readily compatible with synthetic and natural rubbers, has shown no indication of blooming at more than double normal dosage, and does not interfere with the rate of cure. Write for a sample and the Technical Service Report on Nevastain B.

Neville Chemical Company, Pittsburgh 25, Pa.

Resins—Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Alkylated Phenol • **Oils**—Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • **Solvents**—2-50 W Hi-Flash, Wire Enamel Thinners, Nevsolv.

NEVILLE

Please send Technical Service Report on Nevastain B.

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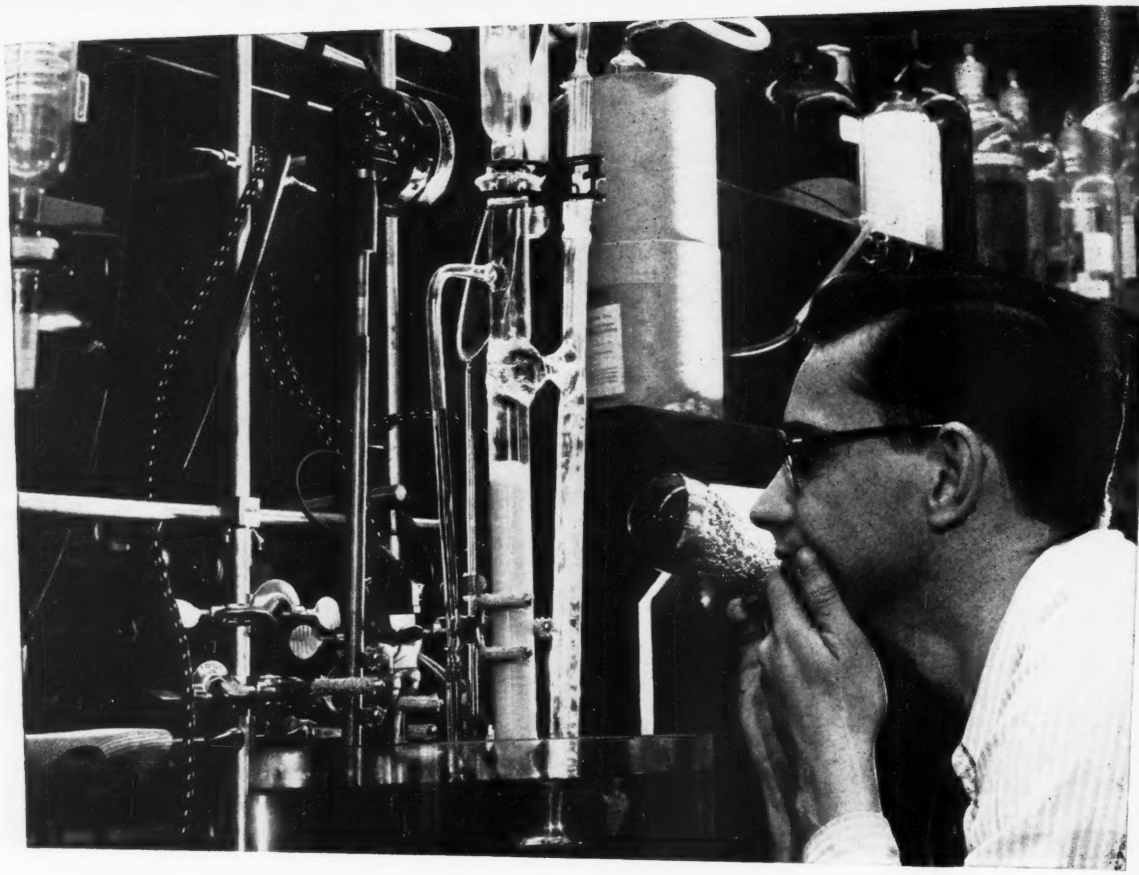

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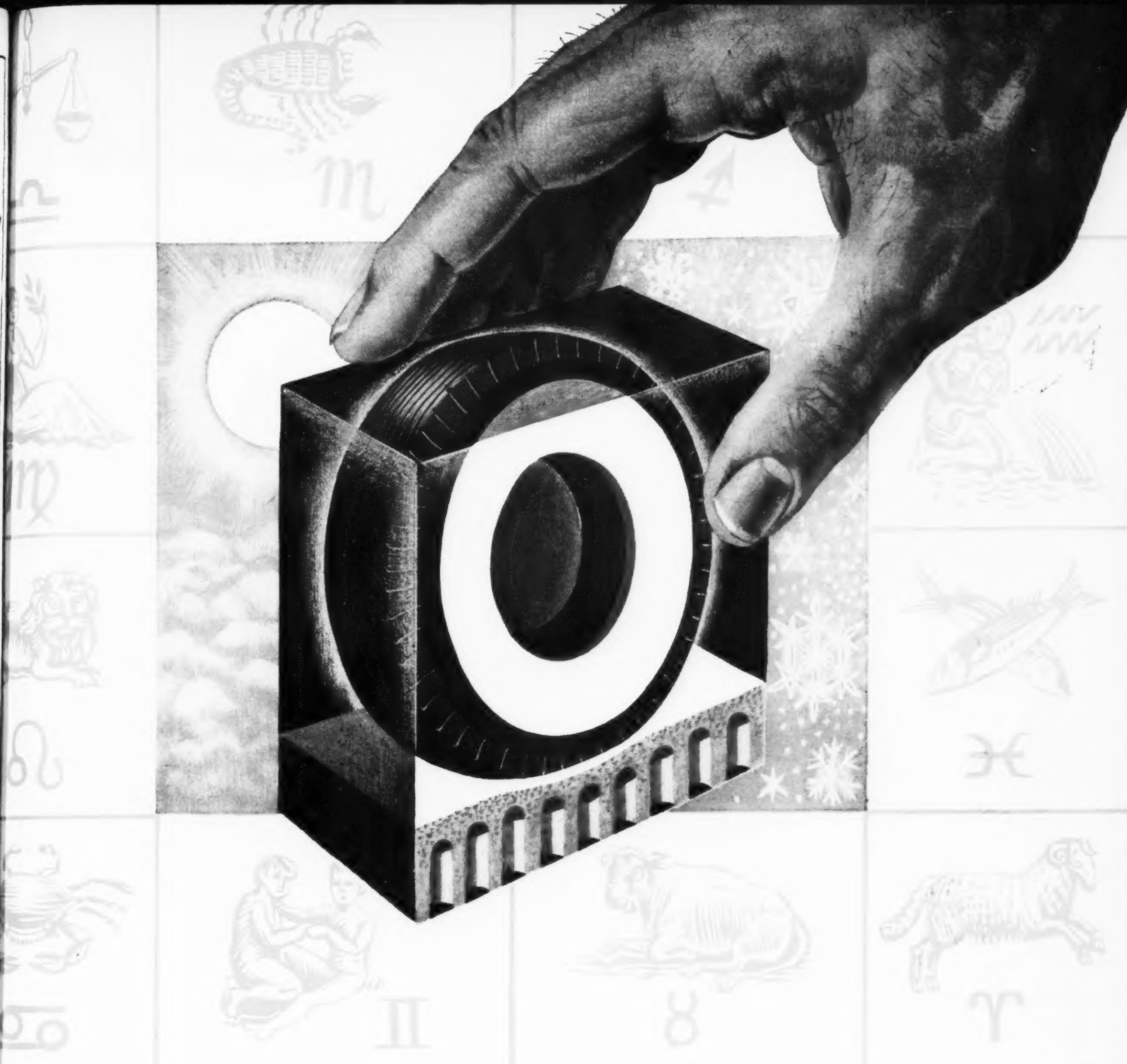

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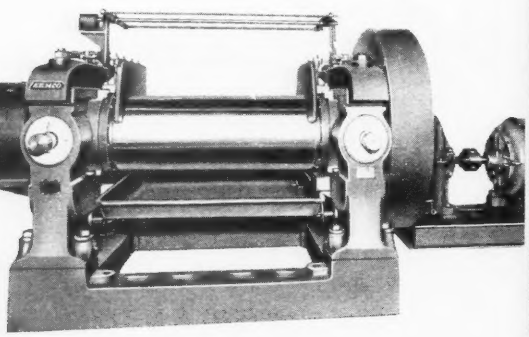

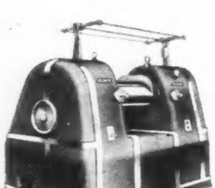

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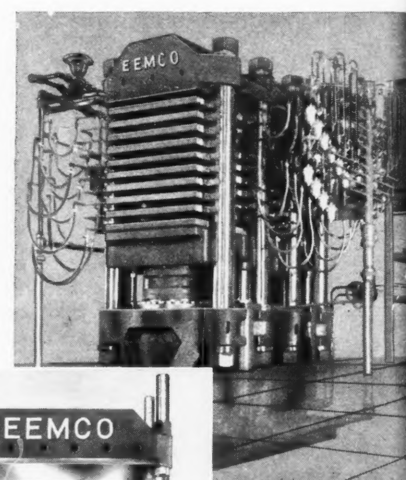

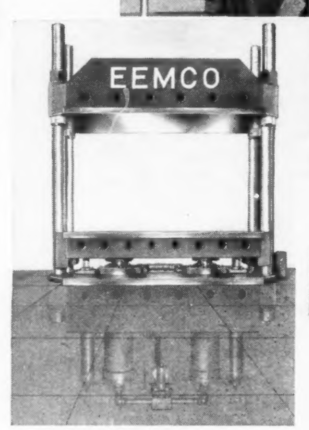

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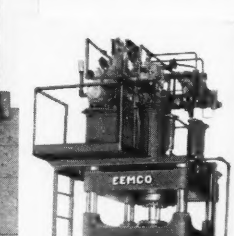

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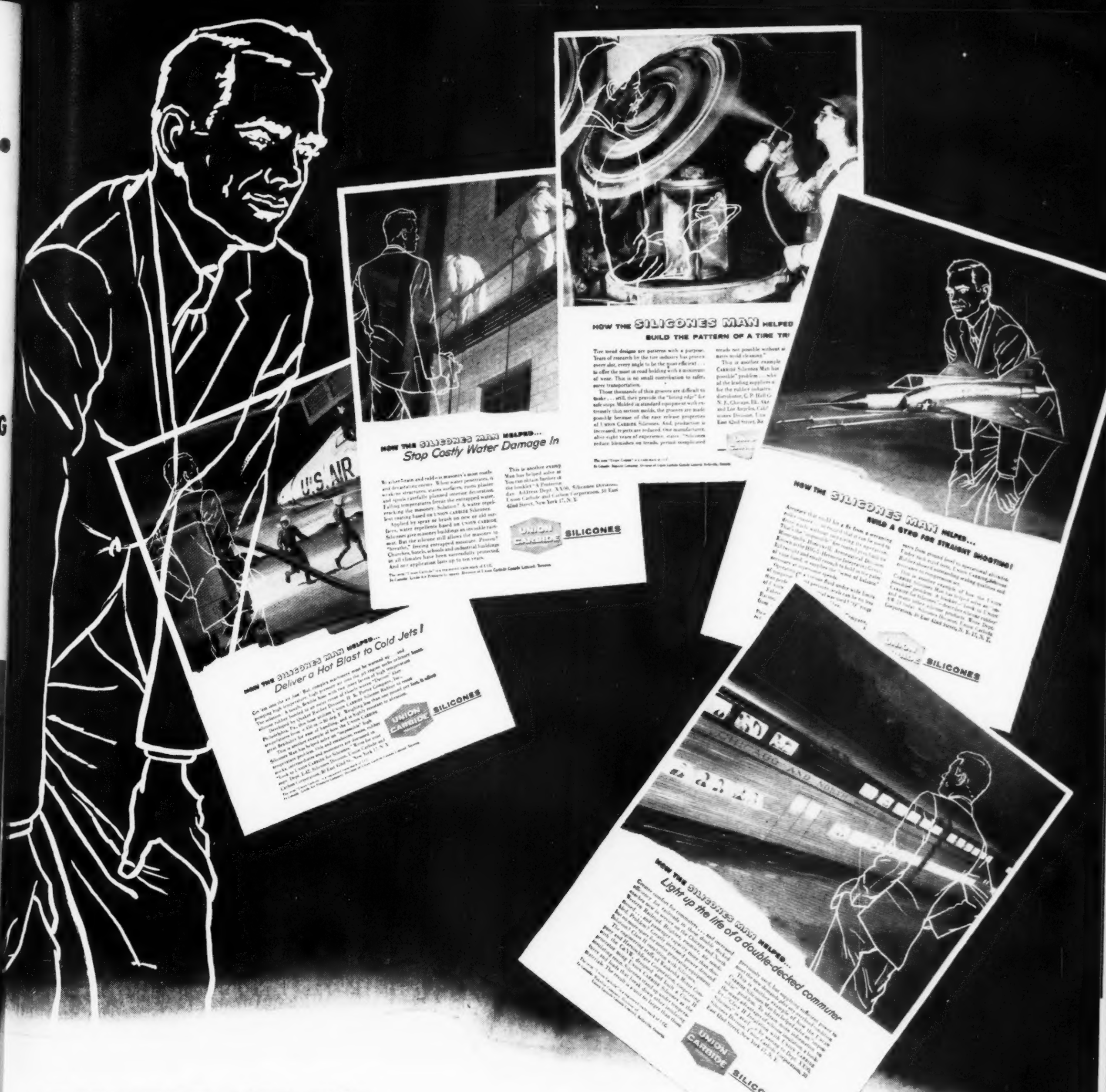

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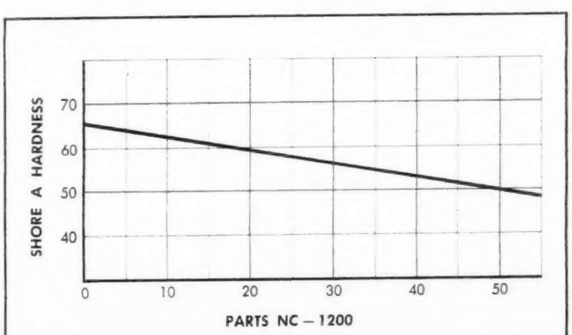

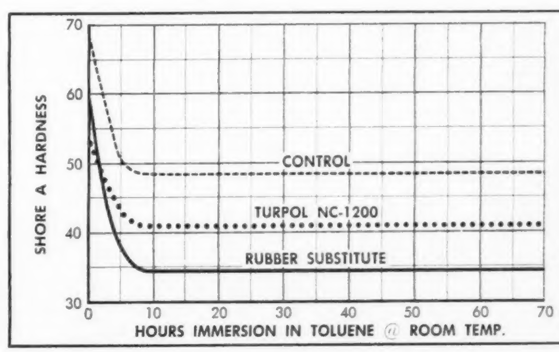

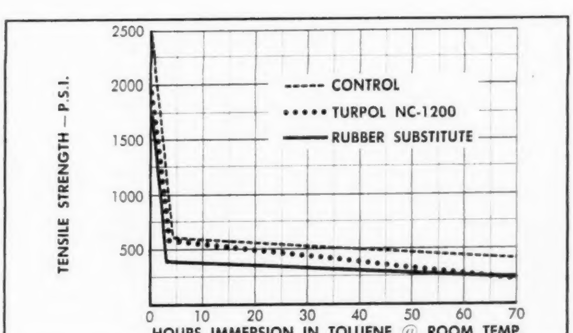

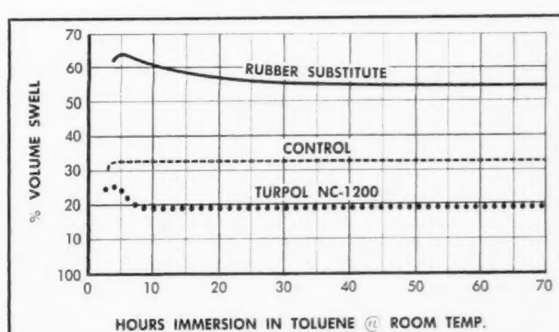

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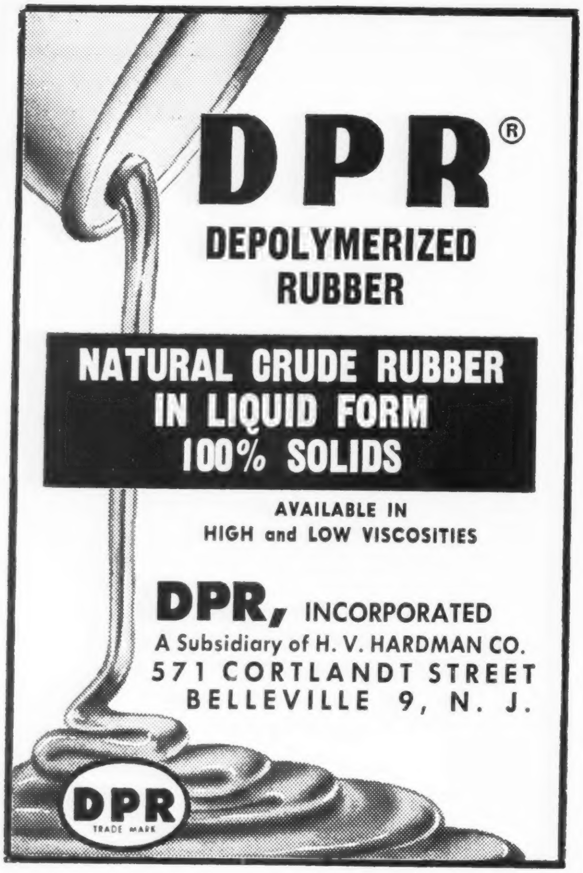

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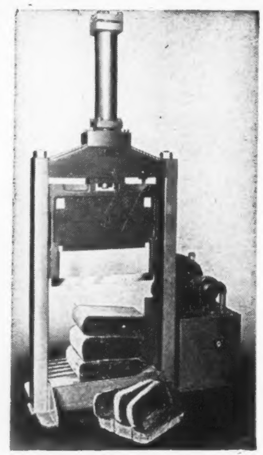

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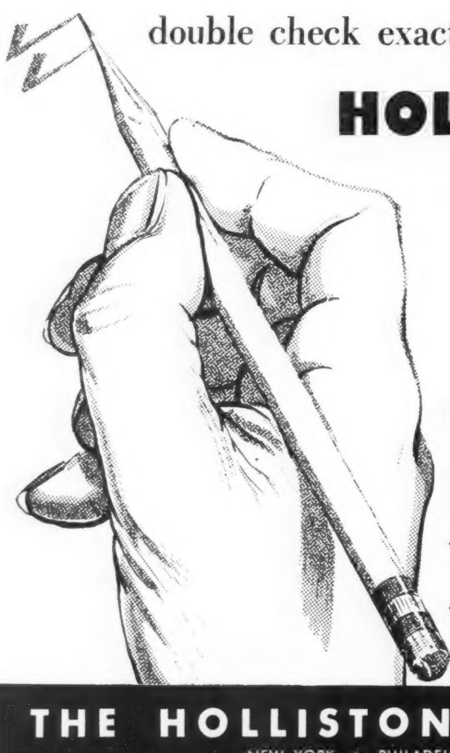

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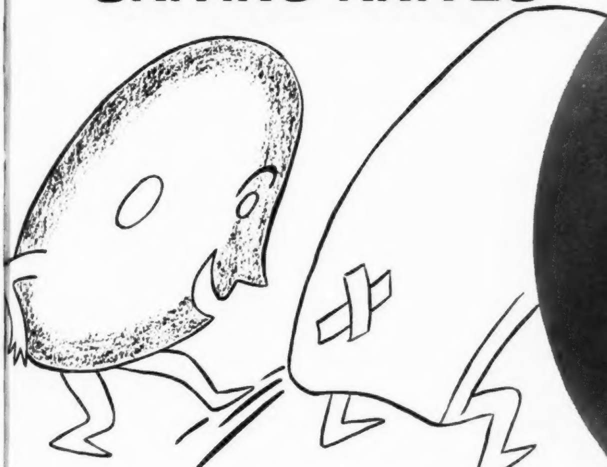

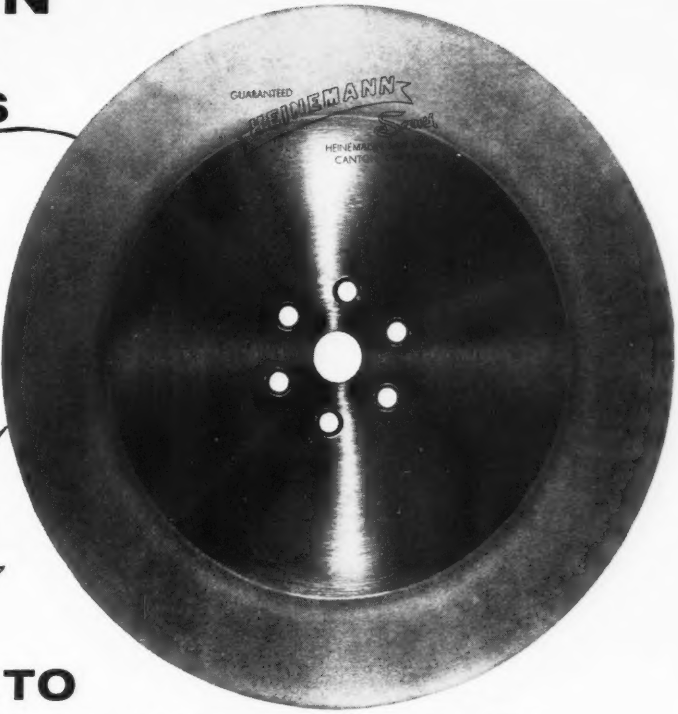

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RUBBER WORLD
EDITORIAL

Natural Rubber Situation Requires Thorough Review

A CONFUSING and paradoxical situation with regard to natural rubber supply, demand, and quality has developed between the consumer in this country and the producer in the Far East. Currently, natural rubber supply has been greater than demand, with much less demand for top-quality grades. In contrast, world production-consumption figures for 1957, as recently revised by the International Rubber Study Group Secretariat, *show consumption greater than production to a greater extent than anything reported for several years.*

There is continuing concern in some quarters that the United States will face an acute shortage of natural rubber in the early 1960's. If natural production does not increase, and the pattern of consumption abroad remains at 80% natural/20% synthetic, as compared with our 35% natural/65% synthetic, the U.S.A. in 1963 may not be able to obtain enough natural, or may have to pay higher prices for material of not too high quality.

One way to alleviate this situation, according to P. W. Litchfield, Goodyear Tire & Rubber Co. would be to increase significantly the capacity to produce synthetic rubber abroad so that some of the natural rubber normally used there would become available to us.

The Rubber Manufacturers Association, Inc., here has been demanding improved natural rubber quality and packing for many years and in February succeeded in having visual inspection standards accepted by 25 rubber organizations in 14 different countries. On the other hand, Allen Conway, vice chairman of the British Rubber Development Board, an organization capable of influencing trends in estate rubber production in Malaya, indicated in New York in October that these producers were uncertain about spending money to upgrade larger amounts of their rubber as long as the American consumer emphasizes price first and quality second in buying natural rubber.

The RMA stated at the time the new international standards were issued that the influence of natural rubber quality is not now controlling in the user's major decisions on synthetic or natural rubber use, but quality will have an accumulative effect in the years to come unless the natural rubber industry takes steps necessary to improve quality and uniformity of its product. Establishment of international standards, however, has not brought the improvement that had been anticipated.

Current events cast shadows of things to come! There is a proposal before the RMA Crude Rubber Committee from Malaya and Singapore for another international quality and packing conference. To hold such a conference in this country in 1958 would seem to be a desirable step, and producer and consumer technical personnel should be included. *What the American consumer really wants and what he can get in the future needs a thoroughgoing review reevaluation at the present time.*

R. G. Seaman

EDITOR

The Tower of Babel[1]

By ARTHUR W. CARPENTER
Akron, O.

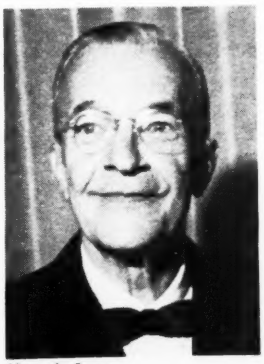
Fig. 1. Goodyear Medal as presented to Arthur W. Carpenter

IN THE ruins of the city of Babylon which were excavated by the Germans in the years before World War I were exposed the remains of the Tower of Babel. This was the tower of the sanctuary of the great Babylonian god Marduk and was opposite the temple of Marduk on the Euphrates which was restored with great splendor by Nebuchadnezzar about 600 B.C. This structure, which had more than once been destroyed and rebuilt, was, at the time of the Babylonian empire, nearly 300 feet high. It was built in seven stages, one above the other, and length and breadth of the lowest stage was the same as the height.

The only account of its original construction is that of the Bible in the Book of Genesis, Chapter 11, for this event occurred in the dim past, some time between the great flood of about 4000 B.C. and the days of the patriarch Abraham, about 1900 B.C. To the descendants of Noah who built it, their whole earth was indeed of "one language and one speech." Living harmoniously together, they undertook to build a city and a tower "whose top may reach unto heaven."

The Lord, when He saw the work, said, "Behold, the people is one, and they have all one language; and *this* they begin to do: and now nothing will be restrained from them, which they have imagined to do."

[1]The Charles Goodyear Medal Award Lecture of the Division of Rubber Chemistry, ACS. Presented at New York, N. Y., Sept. 12, 1957.



Hanns L. Sperr

The Author

Arthur Whiting Carpenter, consultant on rubber technology and former manager of the testing laboratories of The B. F. Goodrich Co., received his B.S. from Massachusetts Institute of Technology in 1913 and his M.S. in chemical engineering from the Institute in 1914.

Mr. Carpenter was a city chemist in charge of the water purification plant at Alliance, O., and then assistant superintendent of the Akron, O., water purification plant until he joined the U. S. Army in 1918. He became a captain in the Sanitary Corps in France.

In 1919, Mr. Carpenter joined the Goodyear Tire & Rubber Co., where he remained for six years. He was factory superintendent of Holtite Mfg. Co. before joining Goodrich as a development engineer in 1927. He became manager of the Goodrich testing laboratories in 1928, a position he retained until his retirement in 1955.

During World War II the Medalist served as consultant to the War Production Board and as assistant director for raw materials of the National Security Resources Board. He received the NSRB Distinguished Services Award after his return to industry.

Mr. Carpenter has been active in administration and committee work of the American Society for Testing Materials since 1928 and was president of the Society in 1947. He served as secretary of Committee D-11 on Rubber and Rubber Products for 28 years. In addition to being an active member of ASTM and the American Chemical Society, he is a Fellow of the American Institute of Chemists and a member of the American Institute of Chemical Engineers and the National Society of Professional Engineers.

Whereupon He confounded their language that they might not "understand one another's speech" and "scattered them abroad from thence upon the face of all the earth, and they left off to build the city. Therefore is the name of it called Babel; because the Lord did there confound the language of all the earth."

In this the name, Babel, is taken as having been derived from the Hebrew "balal," meaning confusion, but another and perhaps better derivation would be the Assyrian "babili" meaning "Gate of the God."

This story from the Bible came to mind when you gave me the great honor of being chosen as Goodyear Medalist of 1957, because the physical and mechanical testing of rubber has often exemplified the confusion which exists when people do not understand each other because of conflicting data. When, through research, development, and standardization, these people become one and are given the same language, there is, in truth, little which "will be restrained from them which they have imagined to do."

Cooperative effort in attaining unification has had much to do with the progress which has been made in the 30 years your speaker has worked in the field of rubber testing. This Goodyear Medal Award (Figure 1) is therefore a recognition not only of his contribution, but also of those of his associates in The B. F. Goodrich Co. and in the committees of the American Society for Testing Materials and the Division of Rubber Chemistry of the American Chemical Society.

Earliest Rubber Testing

When Charles Goodyear discovered the process of vulcanization in 1839, he had no physical means other than hand-tests and visual observations to help him evaluate his product. The final measure of utility was obtained by trial in the intended service, with the result that large losses were often sustained before conclusive answers were available. The unusual elastic behavior of vulcanized rubber, however, early inspired studies of the relation between applied stresses and the resulting deformations. Compressive loads were used in the earliest work, probably because of employment of the material for railroad bumpers. Later the investigations were greatly extended, using tension and torsion.

The work of the pioneers in this field, Hovine (1),[2] Debonnefoy (2), and Boileau (3), Villari (4), Stévart (5), and Mallock (6) has been often referred to in the rubber literature, but it is interesting that Boileau in 1856 noted the difference in effect during loading and unloading now known as hysteresis, and that Villari's data, published in 1869, for stress and strain to the breaking point show, when plotted, a typical stress-strain curve for rubber.

These men were seriously handicapped by lack of knowledge about rubber and suitable facilities for their investigations. Only the simplest apparatus which the experimenter himself devised was available. In tension testing, the rubber specimen was hung vertically from a hook, and the stress was applied by weights placed in a loading pan attached to another hook at the lower end. Elongation was read between gage marks. The problem of gripping the rubber threads or strips, first used, was solved by bending the ends to form loops and binding them while under strain. Stévart was the first to use ring specimens. Today the variation in load application by adding weights by hand could not be tolerated, but these early investigators did not regard it as seriously influencing the results.

Except for these men and a few others who were gradually acquiring scientific knowledge of the fundamental physical characteristics of vulcanized rubber, testing of the material, as we know it, cannot be said to have existed prior to the dawn of the Twentieth Century. It was a time when men concerned with rubber were busy in extending the benefits of Charles Goodyear's discovery, building factories, trying out, and commercializing the wonderful material he made available in suggested uses, numbering more than 500, which he described in Volume II of his book entitled "Gum-Elastic," published in 1853.

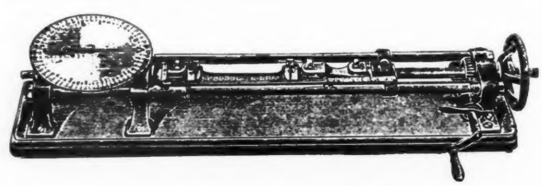


Fig. 2. Hand operated Delaloe machine, as reproduced from "Science of Rubber" by Memmler, American edition, 1934. (Reinhold Publishing Corp., New York, N. Y.)

Chemical Testing

During this period chemical testing also languished for it was a time when the rubber industry was in the hands of practical men whom Disraeli has defined as "those who practice the errors of their forefathers." Chemical analysis, of course, had been used for scientific investigations of rubber ever since Michael Faraday (7) had determined the ratio of carbon and hydrogen in 1826. After Goodyear's discovery of the action of sulfur and heat and that by Parkes (8) of cold vulcanization by sulfur monochloride, both methods seem to have been used for nearly 50 years in the manufacture of rubber goods, with little attention to the chemistry of the processes.

Toward the close of the century, however, C. O. Weber (9) published early results of his extensive studies of the chemical nature of vulcanization which were followed in 1902 by his classic book on "The Chemistry of India Rubber" which summarized the chemistry and technology of rubber known at the time. The controversies following these publications attracted chemists to this new field and led to many additional investigations. One may suppose also that the interest of the rubber manufacturers was aroused because within a few years they began to install laboratories and to employ technically trained people. The start was slow, as is evidenced by the statement of Oenslager (10) on the occasion of the Perkin Medal Award in 1933, that 25 years earlier he was one of three chemists

[2]Numbers in parentheses refer to Bibliography items at end of this article.

Development of physical test methods since the discovery of the vulcanization of rubber by Charles Goodyear in 1839 are reviewed, but physical testing, as we know it, cannot be said to have existed prior to the dawn of the Twentieth Century. Great reliance came to be placed on chemical rather than physical testing in the early 1900's, but during the first decade of the new century, economic and technological factors developed to redirect emphasis to physical means of determining rubber and rubber product properties.

The first testing machines were developed about 1910, and a spreading system of specification purchasing in industry culminated in the organization in 1911 of Committee D-11 on Rubber Products of the American Society for Testing Materials. The first ASTM rubber product standards for fire hose and electrical wire and cable were completed in 1915.

The National Bureau of Standards published the first edition of its now-historic Circular 38 entitled "The Testing of Mechanical Rubber Goods," in 1912, and after World War I the work of new subcommittees in Committee D-11 and a committee on methods of analysis in the Division of Rubber Chemistry of the American Chemical Society resulted in agreement on standard methods for the chemical analysis of rubber products.

At about the same time the Rubber Division, ACS, formed a committee on physical testing and sponsored work at the National Bureau of Standards. Working with ASTM Committee D-11, the Rubber Division in 1930 published a report which gave an outline of a tentative standard procedure for the preparation and physical testing of rubber.

Emphasis on methods of test instead of purchase specifications in the D-11 Committee produced the first special compilation of "ASTM Standards for Rubber Products," in 1935. A joint committee on automotive rubber products of ASTM and the Society of Automotive Engineers was formed in 1939, which has contributed much to the technology of rubber testing and has developed specifications for automotive rubber products.

The precision of the testing of rubber reached its maximum during the period of the Government Synthetic Rubber Program of World War II. Testing equipment was standardized and improved, and the standard deviation of test results in the various copolymer plants was reduced by more than 50% by 1948.

Despite the great progress that has been made there still remains much to be done. The tests presently used are undoubtedly measuring something accurately, but we are not sure just what, and when they fail to evaluate serviceability, it is doubtless because the test and service conditions are different, and we do not appreciate their significance.

engaged in the industry in Akron.

A consequence of the work of Weber and other investigators was to impress the rubber manufacturers with the importance of chemical determinations of free and combined sulfur, and the laboratories of the industry began using these measurements to indicate the state of vulcanization. Also, the presence of large amounts of resins or added softeners was regarded as indicating a poor quality of product because high amounts of natural resins were characteristic of the lower grades of the wild rubbers of the period. Thus great reliance came to be placed in chemical testing, and many of the early rubber chemists were definitely prejudiced against all tests of quality which were not based on chemical analysis. As late as 1911, J. G. Fol (11) stated that only chemical tests were made at the Dutch Government Bureau for India Rubber Trades and Industry in Delft.

Physical Testing—Early 1900's

During the first decade of the new century the stage was rapidly being set for the tremendous changes which were ahead, including not only enormous expansion of production, but also development of new concepts of scientific research and technical control of manufacturing through physical as well as chemical testing. Schidrowitz (12) has noted that Weber made no reference to the classic studies of Stévart on elastic properties of rubber and that he referred to testing for tensile properties in very rudimentary form, recommending that such tests be made in an ordinary cloth testing machine.

A year after Weber's book, Bouasse and Carrière (13) published their work on cycles of extension and retraction, using loads continuously applied by feeding copper chain into a container attached to the lower end of the specimen. This publication was followed by a superb treatise by Bouasse (14) on the elastic moduli of rubber.

Soon thereafter Pierre Breuil (15) began a series of articles which at the time must have been considered revolutionary for he wrote about mechanical tests used for manufactured rubber and compared them with tests of metals. He discussed the effects of many variables and described methods and equipment then employed in the laboratories of the Conservatoire des arts et métiers. Testing machines, built on principles still widely used, were illustrated, including lever and pendulum types as well as the small hand-operated Delaloe machine (Figure 2) employing a calibrated spring. The motion was usually obtained by screws operated mechanically or by hand, and even hydraulic machines were included. Both ring and straight test

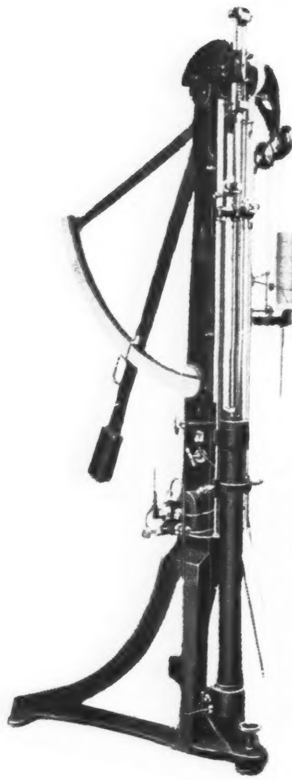


Fig. 3. An early Schopper-Dalen tensile machine. Load was applied by hydraulic pressure from water main directly connected to the apparatus, (From an early catalogue by Louis Schopper, Leipzig, Germany.)

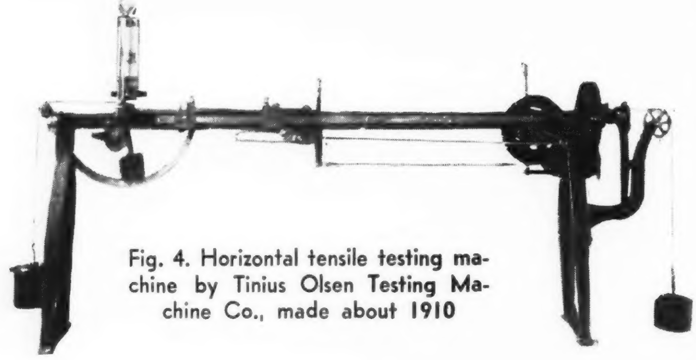


Fig. 4. Horizontal tensile testing machine by Tinius Olsen Testing Machine Co., made about 1910

specimens were used, and a dumbell shape was shown. Some attention was also given to methods which would now be classed as specification and performance tests.

In 1906, the year that Oenslager made the discovery of organic accelerators of vulcanization, an event occurred which was ultimately to have vast influence on the acceptance of physical testing. The U. S. National Bureau of Standards (16) became interested in rubber because of its desire to assist other government agencies in the preparation of purchase specifications. The automobile industry was about to commence its tremendous development, and everywhere technical activity was rapidly growing. In 1907, though not reported until 1916, Dr. Geer (17) started his work at The B. F. Goodrich Co. laboratory on the problem of age deterioration of rubber.

The following year an International Rubber & Allied Trades Exhibition was held in London, and at a conference in connection with it, Frank (18) described the new Schopper-Dalen testing machine. (See Figure 3.) Interest in testing at this meeting was such that it was decided to organize an International India-Rubber Testing Committee. The next spring, as a member of the British section of this committee, Schidrowitz (12) published an article on "The Tensile Properties of India Rubber" in which he discussed the earlier work and equipment and suggested the desirability of standardizing in certain respects some of the physical tests. He also said that the new Schopper machine was the "only one which to his knowledge had been designed solely for work with rubber".

About this time Memmler and Schob (19) started reporting their carefully planned large-scale studies of mechanical testing at the Staatliche Materialprüfungsamt in Berlin-Dahlem and discussed the effects of many variables. They used the Schopper machine for tension tests.

The first American tensile tester designed for rubber which is reported in the literature was a horizontal machine (Figure 4) described by Olsen (20) at a meeting of the American Society for Testing Materials in 1910. This machine was built at the request of Dr. Geer, but apparently was never very widely used because the following year a vertical motor-driven spring-type dynamometer (21) was designed at the National Bureau of Standards and later made available commercially (Figure 5). It was followed in 1912 by the Scott (22) pendulum machine (Figure 6) developed from a fabric tester which had been in use for more than a decade. A vertical Olsen machine (23), long known as the "Navy Tester," (Figure 7) which somewhat resembled the design of Schopper, became available later.

The rapid development of these new machines after so long a period of lethargy was probably due in part to increasing interest in the physical and mechanical properties of rubber, but it appears that the spreading system of specification purchasing with its requisite need of quality definition which could be quickly and reliably measured exerted compelling pressure.

As Lord Kelvin said, "When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind: it may be the beginning of knowledge, but you have scarcely, in your thoughts, advanced to the stage of science."

The railroads had been purchasing materials to specifications for many years and were extending this to ubber products. The government agencies, too, were learning about rubber and preparing specifications. The need of means of acquainting suppliers with the requirements of materials in measurable terms and of assuring delivery, as specified, was being felt all through industry. This, of course, necessitated development of equipment and methods of test which could be used and duplicated in different laboratories in the effort to be "of one language and one speech." Also,

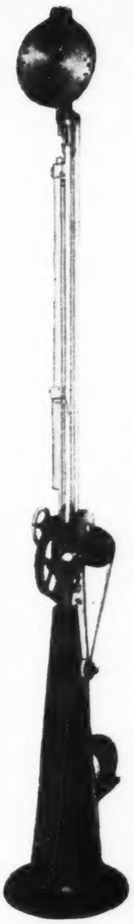


Fig. 5. Motor-driven, spring-type machine developed at the Bureau of Standards in 1912

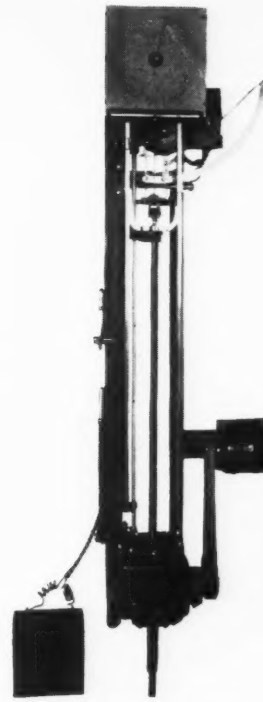


Fig. 6. One of the early tensile machines of Henry L. Scott & Co. (now Scott Testers, Inc.)

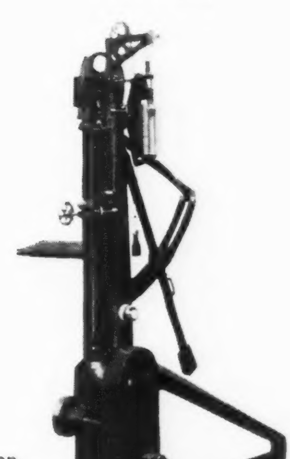


Fig. 7. The vertical Olsen machine, long known as the "Navy Tester"

the increasing use of organic accelerators in rubber compounds was rendering chemical methods less indicative of the quality of vulcanized rubber, with consequent turning toward physical tests.

Need of Standardization

In the Summer of 1911 the International Testing Committee met in London in connection with the Second International Rubber & Allied Trades Exhibition. It is noteworthy that in opening the meeting, Dr. A. H. Berkhout (24), who had been Conservator of Forests of Java, said:

"First of all, we shall have to attack the difficult problem of establishing standard methods. It is, of course, necessary we should agree in regard to the physical and chemical methods to be employed in testing india-rubber. It is not as it should be when a man can see the significance of his own figures, but is not able to understand somebody else's."

Little actual standardization was accomplished at that meeting, but an extensive outline was prepared of tests to be considered. These included stress-strain to break, effect of repeated stretching, tests of abrasion and hardness, effects of heat, light, water, oil, acid, and alkali, permeability to gases, electrical tests and chemical analysis.

That same year, at the Third International Rubber Congress in London, Memmler (25) gave detailed information on the mechanical tests of rubber and the equipment used at Berlin-Dahlem. He described tests of permanent set, aging and folding resistance as well as the Martens' crushing test, Mai abrasion test, Brinnell indentation, Schopper pendulum impact, and others.

Later that year an anonymous writer (26) in the India Rubber World commented, "It is worthy of remark that of late years, the technique of the rubber industry has ceased to rely solely upon data empirically or accidentally found. . . . In every quarter, inventive and creative brains have established mechanical tests, applicable to manufactured products or to those in process at the various plants. Consequently, these tests were from the very beginning diverse in character; varying from one laboratory to another, both in the methods and the machinery employed. On the other hand, these tests are not sufficiently old to have attained uniformity through the adoption as standards of the best and most decisive amongst them. Nevertheless, the introduction of their standardization has been proposed by certain testing machine makers who, with a view to the solution of the problem, have produced testing machines which are intended to meet the requirements of the largest possible number of rubber manufacturers."

ASTM Committee D-11 Formed

The movement for standardization in this country culminated in December, 1911, in the organization of ASTM Committee D-11. It was significant that its first title was "On Standard Specifications for Rubber Products," which was later changed by deleting the reference to "Standard Specifications." The committee consisted that first year of six rubber producers and 14 non-producers, of whom five represented railroads, two were Bureaus of the U. S. Navy, and three were from the electric industry. The objective was obviously to obtain assistance in the preparation of purchase specifications, for the first sub-committees appointed were on products such as hose, belting, packings, and insulating tape.

The first ASTM rubber standards were completed

in 1915 and were specifications and methods of test for fire hose and specifications for electrical wire and cable with insulation containing 30% of *Hevea* rubber. The methods of test for hose which included both chemical and physical tests were intended to be revised to cover additional rubber products from time to time as specifications for them were completed. These methods, however, remained without major change for seven years while the committee worked almost exclusively on product specifications, practically all of which were for goods used either by the railroads or the electric industry.

Meanwhile, in 1912, the National Bureau of Standards published the first edition of its Circular 38 entitled, "The Testing of Mechanical Rubber Goods," describing the equipment and methods employed at the Bureau. The tests covered were tension tests using the new Bureau of Standards dynamometer, elasticity or permanent set using a special extension table, reduction in tension when stretched to a definite elongation (stress decay) and "friction pull" (ply adhesion) by the dead weight method.

The above-mentioned apparatus was all either designed or adapted by P. L. Wormeley (27) who in 1914 presented a paper at the Fourth International Rubber Congress at London on the "Influence of Temperature on the Tensile Properties of Rubber Compounds." In this paper Wormeley mentioned the use of the above tests in specifications in the United States and the variations in each of them resulting from testing at different temperatures. He pointed out the need of standardization, the object of which, he pertinently remarked, "should be to make the work of different laboratories comparable." Thus he implied the confusion which was to grow worse before improvement came.

Variations in results were unavoidable when people were just learning the effects of the many variables in test conditions, but as laboratory workers became familiar with them, the less scrupulous sometimes used them to their own advantage. Before temperature of testing was specified, a passing hardness value, for example, could often be obtained by immersing soft specimens in cold water for a time.

I am reminded also of the early worker whose job required testing of tensile strength of specification goods, using a small hand-operated screw machine. When his results were low, he turned the handwheel faster.

In commenting on this, he said, "I got so I could play that machine like a violin."

Nevertheless, the variations encountered in ordinary every-day testing, carried out with what was thought to be proper care, were the source of endless difficulty.

Joint ASTM-ACS Efforts

By the end of World War I, testing problems had become so annoying that various agencies began to give them serious attention. In 1920 a sub-committee on Standard Procedure for Testing Rubber Products was authorized by ASTM Committee D-11, and work was started on general methods of physical testing to include and replace the old fire hose methods. Shortly thereafter, the National Bureau of Standards advised the committee that a project was being started there on rubber. The committee suggested that first consideration be given to an accelerated aging test and appointed a special sub-committee to cooperate. Also, a new sub-committee on chemical analysis was organized to take over the work of the Joint Rubber Insulation Committee which had been concerned with chemical methods for a period of about seven years.

At the same time a committee on methods of analysis was appointed by the Division of Rubber Chemistry of the ACS, which had been officially organized in 1919. The chairmen of these committees, Simon Collier (28) for the Rubber Division, and C. R. Boggs for Committee D-11, held a joint meeting in Pittsburgh in 1922 and agreed on a draft of standard methods of chemical analysis of rubber products. These methods were eventually approved and published by ASTM and have since stood with comparatively few revisions as a landmark of standardization in rubber technology.

At about this same time Committee D-11 formed a subcommittee on performance tests for which work on abrasion, aging, and oil-resistance was planned, and, later, flex-life of belting was added. Meanwhile the Division of Rubber Chemistry had appointed a committee on physical tests, of which W. W. Vogt was chairman. Its report (29) to the Division in April, 1924, was a masterful presentation of the methods of preparing and testing experimental vulcanizates by the so-called tension tests, including discussion and experimental data on many of the variables requiring standardization.

In 1926 a new enlarged physical testing committee was appointed to investigate the effects of variables such as temperature and relative humidity upon the physical properties of rubber. This committee chose the problem of determining the importance of controlling atmospheric temperature and relative humidity while conditioning rubber test samples at various stages of preparation and testing. The work was carried out at the National Bureau of Standards by F. E. Rupert as a research associate under the direction of the committee. A report (30) published in 1928 dealt with stress-strain and tensile properties, and another (31), the following year, with abrasion resistance. Finally, in 1930, the committee published a recommended outline of a tentative standard procedure for the preparation and physical testing of rubber (32).

At that time the suggestion was made by J. W. Schade (33), but was not followed, that the committee extend the work by having a representative go to various laboratories in the industry and apply the principles of standardization in the recommended procedure so as to try to eliminate the conflicting results often obtained on the same material tested in different laboratories.

Many of you probably remember the tremendous variations which were common in the results of physical tests when the Rubber Division was sponsoring this work. These were particularly pronounced with compounds of the pure gum type. In a statistical study of stress-strain tests of 94 test pieces cut from a single

factory inner tube, Wiegand and Braendle (34) reported tensile strength results ranging from extremes of 2,220 to 2,950 psi., with a distribution curve skewing toward the higher value.

When tests were made in different laboratories, the results were worse, as was shown in a study of aging tests of three compounds in eight laboratories conducted by an ASTM subcommittee. The test sheets were compounded, mixed, and cured in one laboratory, and, in all, more than 5000 dumbbells were pulled. When, after three years, the work was completed, the subcommittee was unable to report any definite conclusions because of the variations obtained from both the original and aged specimens.

By that time the ACS procedure had become available, and the subcommittee repeated the original test of one compound in 13 laboratories. In reporting this series, the chairman, R. A. Schatzel (35), stated that whereas the previous variation in tensile strength had been between 2,920 and 4,144 psi., the new one was between 3,232 and 3,792 psi. The maximum variation of all laboratories, checked against the average tensile strength, was approximately 6%. A similar value was obtained for the moduli at 400, and 600%, while ultimate elongation gave much closer agreement. Similar improvement from standardization on the ACS die and controlling atmospheric conditions was reported by W. L. Sturtevant (36) in a series of tests in five laboratories.

Emphasis on Test Methods

During the period of the great contributions by the Rubber Division, ASTM Committee D-11 was undergoing change. The need of better tests was increasingly realized, and dissatisfaction with some of the existing product specifications grew, both because of lack of agreement in the test results required for their enforcement, and because it was felt that they failed to give adequate assurance of serviceability in many industrial applications. Consequently the Committee decided to concentrate on development and standardizatoin of test methods, leaving the question of detailed purchase specifications for reconsideration after establishment of suitable standard methods of test.

With this change in objective, progress became rapid. New subcommittees were formed which studied and prepared many new test procedures, obsolete specifications were withdrawn, and technical papers on rubber properties and testing began to appear in ASTM publications. The Rubber Division, ACS, standard procedure for physical testing was incorporated so far as possible in ASTM methods.

Finally, in 1935, the first of the special compilations of "ASTM Standards on Rubber Products" (37) was issued. This book, presenting in consolidated form the results of many years of effort by numerous workers in the field of voluntary standardization of chemical, physical, and electrical testing of rubber products, soon became an indispensable laboratory manual as well as a reference source for specification writers. It has since been published on an annual basis, incorporating the results of new developments and changes agreed upon in the parent committee until the book is now a substantial volume of more than 800 pages having very wide acceptance in the industry.

With the achievement of a considerable degree of standardization in rubber testing by agreement after the long years of research for new knowledge and of development of new methods and test equipment, there still remained the problem of having the individual laboratories apply the standard methods with the care and meticulous attention to detail which are necessary for success in test work. Troublesome variations still occurred which were often shown to be caused by some small detail or lack of refinement of equipment which had been overlooked.

In other cases, existing knowledge concerning the test or the characteristic being measured was not sufficient to permit the accuracy desired. Important contributions in this phase of the testing problem have been made by the Joint ASTM-SAE Technical Committee on Automotive Rubber organized by the two societies in 1939 as a cooperative meeting place for automotive engineers and rubber technologists. In addition to outstanding work on rubber testing, this committee has developed specifications (38) for automotive rubber which have greatly simplified purchasing practices in the industry.

GR-S Program Testing

The culmination came in the synthetic rubber program of World War II when, of necessity, standardization reached the highest level yet attained in the rubber industry. The story of this program has been often told and is familiar to most of you. It was realized from the beginning that the plants and their operation, the processes and the testing of the product would require the utmost in standardization to produce uniform rubber at so many locations, and every effort was made to assure that result. I do not need to mention, for example, the adoption of GR-S for the greater part of the production, the design of the standard plant, or the precautions that were taken to assure uniform raw materials.

These and many other phases of the program, including the standardization of manufacturing processes and of testing controls both during manufacture and on the finished product, have been discussed in detail by Livingston and Cox (39) in their very thorough chapter on "The Manufacture of GR-S" in the book, "Synthetic Rubber," published under the auspices of our Division of Rubber Chemistry. I only wish to emphasize their statement that:

"Before 1943, the accuracy of the physical testing of vulcanized rubber by the rubber industry left much to be desired; systematic errors were found in most physical testing laboratories, and there was considerable variation between different laboratories."

They further state that in consequence of an intensive drive to improve the precision of laboratory testing, the standard deviations of the test results obtained in the various copolymer plants in 1948 had been reduced to a level only one-half to one-sixth that of 1943.

This drive for reduced variability of test results was

Fig. 8. Instron Engineering Corp. floor model with load capacities from two grams to 10,000 pounds

carried out on many fronts (40). A standard reference laboratory was built in Akron. Uniform lots of laboratory compounding ingredients were established and standardized by the National Bureau of Standards. Daily testing of reference lots of standard rubber by each laboratory was required. Testing equipment was standardized and improved by the National Bureau of Standards and the testing machine manufacturers. Examples are the modification of the Mooney viscometer (41) and the ORR L-5 model of the Scott tester (42). Finally, an educational program like that suggested by Schade to the physical Testing Committee in 1928 was adopted, and Dr. Garvey, your present Rubber Division chairman, then with the Office of Rubber Reserve, and R. D. Stiehler, of the National Bureau of Standards, visited each laboratory and assisted in training all technicians to perform the tests by the same standard procedure. In standardization of testing it is indeed necessary to follow the admonition of Pasteur (43) to "Exhaust every combination, until the mind can conceive no others possible."

Of recent years the rubber literature, covering the investigations of physical and mechanical behavior of the material and the new methods and equipment for measuring them, has grown to such proportions that even the most important contributions cannot be mentioned here. During the past two decades a large proportion of these developments has resulted from the stimulus of the synthetic rubber program and has been surveyed by A. E. Juve (44) in his excellent chapter in the book "Synthetic Rubber" referred to previously.

Continued Progress Necessary

Despite the great progress which has been made there is still much that remains to be done. Too little is known about the complex properties such as abrasion resistance, adhesiveness, and tear resistance. Fundamental scientific work is needed as to the precise mechanism of these phenomena and their relation to the intimate structure of the material, before good methods of controlling and measuring them can be developed. The tests presently used are undoubtedly measuring something accurately, but we are not sure just what, and when these tests fail to evaluate serviceability, it is doubtless because the test and the service involve different conditions of which we do not appreciate the significance, if indeed we are aware of them at all. When we become annoyed at difficulties of this sort, let us consider how badly we would be handicapped in rubber manufacture if we had to do without our magnificent laboratories with their wealth of equipment and the years of research which have produced them and go back only half way to the time of Charles Goodyear when the only means of judging quality and serviceability was to try an article in the intended service.

Unfortunately, research in physical testing does not appear to offer prospect of immediate financial return, and it is therefore often difficult to obtain for it the necessary support both in manpower and money. Yet history provides ample evidence that the development of new methods of observation and measurement is an indispensable forerunner of many of the greatest discoveries.

The X-ray opened the way to our present knowledge of the crystallization of rubber (45) as well as enabling the physicians and surgeons to diagnose and treat many of our bodily ills. The electronic vacuum tube gave us radio and television. The electrical resistance strain gage combined with the vacuum tube and cathode-ray oscilloscope has made possible not only better rubber testing machines (46-47) (Figures 8-9), but also the studies of stresses and vibration under conditions of service which have resulted in safer, more comfortable automobiles and lighter, better airplanes. The electron microscope has revealed new worlds in the field of reinforcing pigments as well as new viruses of disease. As a final recent example, infrared spectrometry (48) has enabled us to know when we had produced a synthetic rubber which is really a duplication of the natural product.

It is interesting to wonder how many laboratory workers on synthetic rubber in the past may have made this material in their mixtures without realizing its existence because they had no way of identifying it. Truly, in the words of Pasteur (49):

"All things are hidden, obscure and debatable if the cause of the phenomena be unknown, but everything is clear if this cause be known."

We must devote more attention to causes.

We are now on the threshold of a new age—that of the utilization of atomic energy. Tires have already been vulcanized by the rays of this source of energy. Who knows what great events lie ahead?

Two years ago Dr. Dinsmore (50) told us about

the depth and breadth of knowledge required today of a rubber technologist. Again, we are reminded of the words of Pasteur (51), who said "The Sciences gain by mutual support," and "It is characteristic of science to reduce incessantly the number of unexplained phenomena."

While we cannot now see the future, it is clear that we have in the industry the depth and breadth of knowledge in all of the sciences that will be required to meet the challenge to the end that the unexplained shall disappear. In the words of Michael Faraday (52), "In the pursuit of science, we first start with hopes and expectations; these we realize and establish, never again to be lost, and upon them we found new expectations of farther discoveries, and so go on pursuing, realizing, establishing and founding new hopes, again and again."

Perhaps, at last, we shall rebuild the Tower of Babel which will reach unto the Gate of the God.

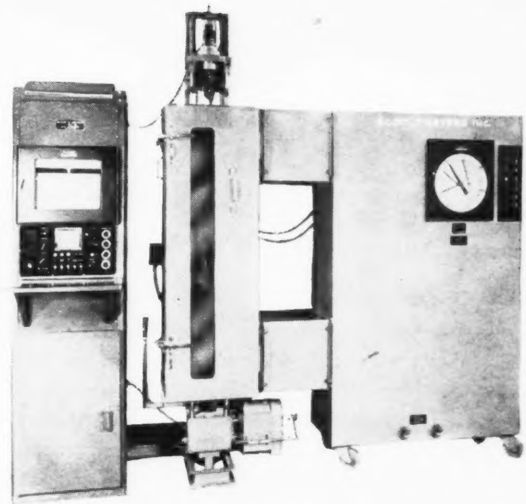


Fig. 9. Scott Testers machine equipped with Accr-O-Meter electrical weighing and recording system, and high- and low-temperature condition box and test chamber

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Advanced Statistical Methods Course

The American Society for Quality Control, chemical division, is offering a short course in advanced statistical methods, the first of its kind directly applicable to investigations of chemical processes. The course is intended for research and technical workers with experience in the statistical design of experiments in the chemical industries.

The discussion will cover the latest statistical developments in factorial designs and in linear and non-linear estimation. The course will be given at the Harvard Business School, January 12-23, 1958, and will cost $375 including lodging and meals. Address Richard S. Bingham, Jr., Carborundum Co., Research & Development Division, P. O. Box 337, Niagara Falls, N. Y.

Viton A—Effect of Fillers on Heat and Fluid Resistance

By A. L. MORAN

E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.

The effect of various fillers and reinforcing agents on a new fluorine-containing elastomer, Viton A, shows that all of these materials increase modulus, reduce elongation, and increase the hardness of the vulcanizates. Mineral fillers produce harder, higher modulus stocks than MT or FEF blacks.

Increasing amounts of MT black or 20-volume loadings of the other fillers contribute very little to the excellent heat resistance at 450° F.

Viton A compounds containing various fillers and reinforcing agents vary widely in their resistance to different fluids. Proper filler loadings can make a marked improvement in this resistance, as judged by volume swell measurements and retention of physical properties after immersion.

VITON A is a fluorine-containing elastomer with remarkable chemical and thermal stability. This synthetic rubber shows excellent retention of its elastomeric properties after prolonged exposures to temperatures in the range of 400 to 500°F. In addition, it is resistant to a wide variety of fluids including aromatic and aliphatic hydrocarbons, aromatic amines, chlorinated hydrocarbons, and mineral acids and alkalis. Although this new fluorine-containing elastomer is still in the development stage, a considerable number of elastomeric parts have been made and tested with excellent results.

The new elastomer is readily processable, using standard rubber processing procedures. A typical compound contains a curing agent, a filler, and an acid acceptor. Materials such as zinc, magnesium, and lead oxides are effective acid acceptors. A wide variety of fillers including both carbon black and mineral fillers can be used with Viton A. Vulcanization is effected with a polyamine or a free radical generator such as benzoyl peroxide. Vulcanization systems and the general physical properties of Viton A have been discussed in detail in earlier references.[1-4]

This paper discusses the relation of fillers to the heat and fluid resistance of the compounded elastomer. Studies have revealed that for optimum heat resistance and/or fluid resistance of such vulcanizates the proper amount or the proper type of filler should be used. Improvements in heat and fluid resistance achieved in this manner may be judged small, but in many of the critical applications where Viton A is being considered for use, they are very significant.

Test Procedures

The stocks shown in Table 1 were mixed on a 2½-inch by 7-inch laboratory mill. The mixed stocks were held overnight at room temperature and given a five-minute remill prior to sheeting out for cure. Two types of slabs were cured:

(a) One- by 2- by 0.025-inch slabs—used for stress-strain properties and volume swell measurements;
(b) 1½- by 2½- by 10-inch slabs—used for compression set measurements.

These slabs were cured, as shown in Table 1. Tests were conducted as follows.

[1]J. S. Rugg, S. Dixon, D. S. Rexford. RUBBER WORLD, 134, 719 (1956). (Abstract only.)
[2]M. W. Riley, *Materials in Design Engineering*, 46, 90 (1957).
[3]W. R. Griffen, RUBBER WORLD, 126, 687 (1957).
[4]J. S. Rugg and A. C. Stevenson, *Rubber Age (N. Y.)*, 82, 10 (1957).

The Author

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TABLE 1. EFFECT OF FILLERS ON THE ORIGINAL PHYSICAL PROPERTIES OF VITON A

Viton A	100
Zinc oxide	10
Dibasic lead phosphite[a]	10
Filler	as indicated
Hexamethylenediamine carbamate[b] (micronized)	as indicated

Press cure: 30′/300° F. Oven cure: Step cure to 400° F. and 24 hours/400° F.

Original Physical Properties

Filler	Volume	Parts	Parts HMDA-C	Modulus, Psi., 100% Elong.	Tensile Strength, Psi.	Elongation, %	Hardness, Shore A	Compression Set Method B 72 Hrs./121° C.
None	—	—	1	200	2200	400	58	19.4
MT Black	20	19.4	1	350	2625	350	65	16.9
	40	38.8	1	625	2525	300	74	19.7
	60	58.2	1	950	2400	250	80	20.8
	100	97.0	1	1400	1950	175	91	33.6
	140	135.8	1	1450	1600	125	96	53.9
FEF black	20	19.4	1	500	3225	375	70	34.8
Ppt. whiting[c]	20	28.6	2	1050	3250	220	80	12.4
Blanc fixe	20	47.4	2	900	2350	230	75	8.0
Calcined clay[d]	20	28.4	2	775	1925	225	75	20.8
Fine silica[e]—silicone oil[f] (100/20)[f]	20	25.2	2	900	2525	350	86	37.6
Silene EF[g]	20	21.6	2	700	3125	350	80	32.8

[a] Dyphos—National Lead Co., New York, N. Y.
[b] HMDA-carbamate—Jersey City Chemical Division, Minnesota Mining & Mfg. Co., Jersey City, N. J.
[c] Super Multifex—Diamond Alkali Co., Cleveland, O.
[d] Iceberg Clay—Burgess Pigment Co., Sandersville, Ga.
[e] Hi-Sil 233—Columbia Southern Chemical Corp., Pittsburgh, Pa.
[f] LM-3 Oil—Silicone Products Division, Union Carbide & Carbon Co., New York, N. Y.
[g] Columbia Southern Chemical Corp.

Stress-Strain Properties

Small dumbbell test specimens with an 0.5- by 0.1-inch neck were die cut from the test slab. These were pulled on a Scott tester[5] at 20-inches per minute. In general, results correlate well with those obtained on standard-size dumbbells (1- by 0.25-inch neck) except that tensile strength tends to run approximately 10-15% higher with the small dumbbells.

Heat Aging

Small dumbbells were aged for 14 days at 450°F. in a circulating air oven in accordance with ASTM D 573-53.[6]

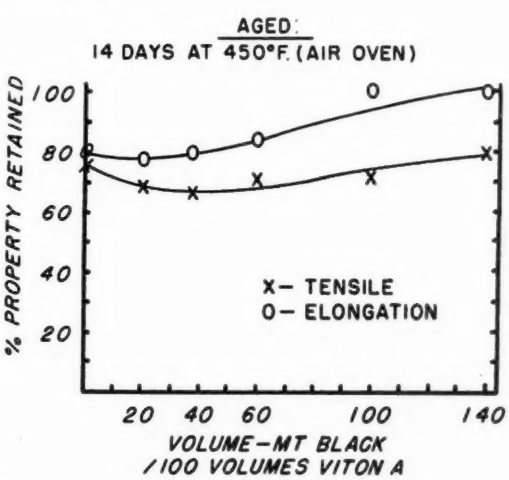


Fig. 1. Effect of MT black loading on heat resistance as measured by % tensile and elongation retained

Fluid Aging

Small dumbbells were suspended in the various fluids, aged and tested in accordance with ASTM D 471-55T.[7] The test fluids and immersion conditions were as follows:

(1) Petroleum base fuel (JP-4)[8]—seven days at 75°F. (2) 70/30—isooctane/toluene (Reference Fuel B)[7]—seven days at 75°F. (3) Silicate-ester type hydraulic fluid (OS-45)[9]—seven days at 400°F. (4) Diester lubricant (Turbo Oil 15)[10]—seven days at 400°F.

Volume Swell Measurements

Molded slabs were cut in half, giving duplicate test samples, one inch by one inch by 0.025-inch. These were immersed, and volume swell measurements made in accordance with ASTM D 471-55T. Note that the test specimens were not the standard one- by two- by 0.075-inch called for in the ASTM procedure. Thus in some cases volume increase values shown in this article will be higher than those obtained with standard test specimens.

Compression Set

Plied pellets were prepared by die cutting five 0.5-inch diameter circular pieces from the 1½- by 2½- by 0.10-inch slab. These were plied and tested according to ASTM D 395-55, Method B.[11]

[5] Scott Testers, Inc., Providence, R. I.
[6] "ASTM Standards on Rubber Products," p. 310. American Society for Testing Materials, Philadelphia 3, Pa. (May, 1957).
[7] *Ibid.*, p. 270.
[8] U. S. Air Force jet engine fuel, MIL-F-5624.
[9] Silicate ester-type hydraulic fluid, Monsanto Chemical Co., St. Louis, Mo.
[10] Esso Standard Oil Co., New York, N. Y.
[11] "ASTM Standards on Rubber Products," p. 202 (May, 1957).

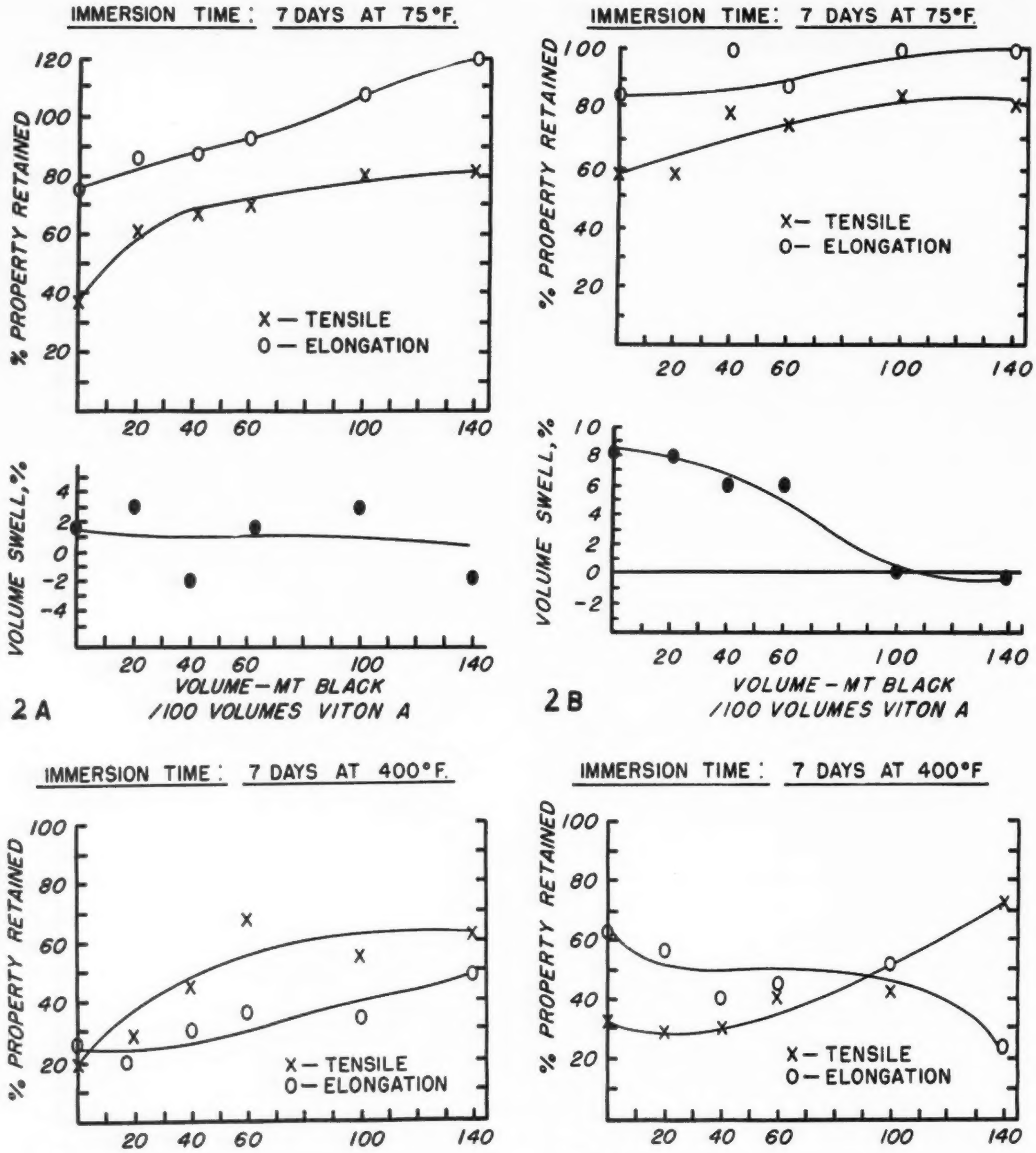


Fig. 2. Effect of MT black loading on resistance to: jet engine fuel JP-4 (2A, upper left); ASTM D 471-55T Reference Fuel B (2B, upper right); OS-45 fluid (2C, lower left); Turbo Oil-15 (2D, lower right); in terms of % tensile and elongation retained and % volume swell

Effect of Fillers on Original Physical Properties

Table 1 presents a comparison of the physical properties obtained with a 20, 40, 60, 100, and 140 volume loading of MT carbon black on 100 volumes VITON A with that of a gum stock. A comparison is made between 20-volume loadings of two types of carbon black and five types of mineral fillers. (Hi-Sil 233 has a tendency to retard the cure of Viton A stocks; therefore it was mixed with a small amount of LM-3, a low molecular weight silicone oil in order to reduce this retardation.) One part of hexamethylenediamine carbamate (HMDA-carbamate) has been used as the curing agent with the black fillers, and two parts with the mineral fillers. Proper dispersion of HMDA-carbamate is essential for maximum physical properties. A micronized form of HMDA-carbamate, having an average particle size of 1-2 microns, has been found to produce excellent results.

Increasing amounts of MT carbon black produce a higher modulus, lower elongation, and increased hardness. Tensile strength reaches its maximum, with a 20-volume loading and then falls off until at the 100- and 140-volume level it is less than that of a gum stock. Compression set is at a minimum at the 20-volume level and then rises until at the 100- and 140-level it is above that of the gum stock.

A comparison of the mineral fillers with the black fillers at the same 20-volume loading shows that all of the mineral fillers produce harder, higher modulus stocks than either the MT or FEF black stocks. FEF black, precipitated whiting (Super Multiflex), fine silica (Silene EF) produce unusually high tensile stocks at this loading. Stocks containing blanc fixe and precipitated whiting are far superior to the others in compression set resistance.

Effect of Amount of Filler on Heat and Fluid Resistance

Heat Resistance (Figure 1)

Increasing amounts of MT black have little or no effect on the heat resistance of a Viton A stock as measured by % tensile strength retained. There is an improvement in % elongation retained with 100 and 140 volumes of black, although, of course, these stocks have a relatively low original elongation.

Fluid Resistance

JP-4 (Figure 2A). Viton A stocks have excellent resistance to swelling in JP-4 fuel, and increased carbon black loading has no effect on this. Gum stocks, however, tend to lose a considerable amount of their original tensile strength while immersed in this fluid, and increasing concentrations of MT black are definitely beneficial.

Reference Fuel B (Figure 2B). The swell of a Viton A stock in this test fluid can be reduced considerably by increasing amounts of MT black. A stock containing 100 volumes of MT black exhibits 0% swell after seven days at 75° F. in this fluid. In addition, there is a general increase in physical properties retained with increasing amounts of black.

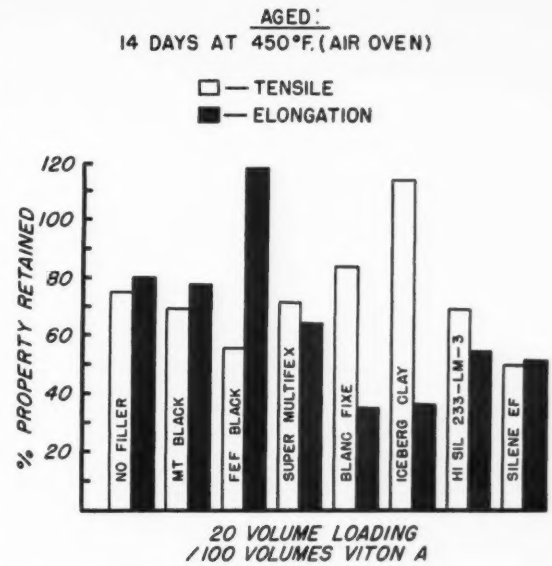


Fig. 3. Effect of type of filler or heat resistance as measured by % tensile and elongation retained

OS-45 (Figure 2C). Low amounts (20 and 40 volumes) of MT black in a Viton A stock cause increased swelling in this particular hydraulic fluid. Lower swells are obtained with 60 volumes or more of black. Retention of physical properties is increased with increased carbon back loadings.

Turbo Oil 15 (Figure 2D). Stock containing more than 20 volumes of MT black shows less swell and greater retention of tensile strength than gum compounds or those with low loadings. Contrary to the results obtained with other fluids, stocks containing MT black retain less of their original elongation than does the corresponding gum stock.

Effect of Type of Filler on Heat and Fluid Resistance

Heat Resistance (Figure 3)

Except in a few special cases fillers, in general, do very little to improve the excellent heat resistance of Viton A. Exceptions are the stock containing calcined clay (Iceberg), which shows a very high % tensile strength retained after aging, and the stock containing FEF black which is excellent from the standpoint of elongation after aging.

Fluid Resistance

JP-4 (Figure 4A). Fillers have little or no effect on the excellent resistance of Viton A to swelling in JP-4. All of the stocks containing fillers show better retention of physical properties than the gum stock. The silica fillers, Hi-Sil 233/LM-3 and Silene EF, are particularly good in this application.

Reference Fuel B (Figure 4B). Stocks containing FEF black and precipitated whiting show the least tendency to swell in this fuel as well as the best overall retention of physical properties.

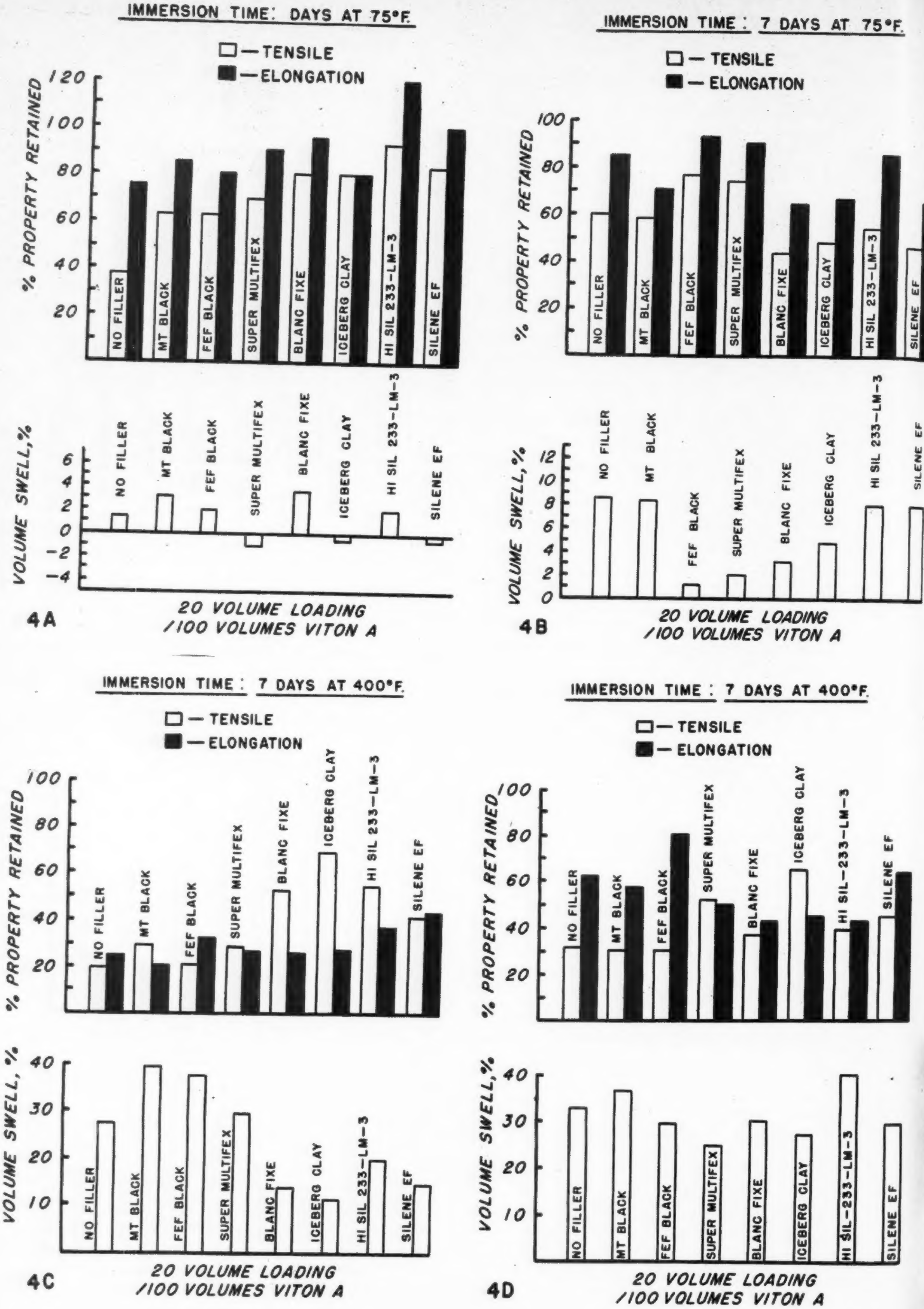


Fig. 4. Effect of type filler on heat and fluid resistance: jet engine fuel JP-4 (4A, upper left); Reference Fuel B (4B, upper right); OS-45 fluid (4C, lower left); Turbo Oil-15 (4D, lower right); as measured by % tensile and elongation retained and % volume swell

(Continued on page 258)

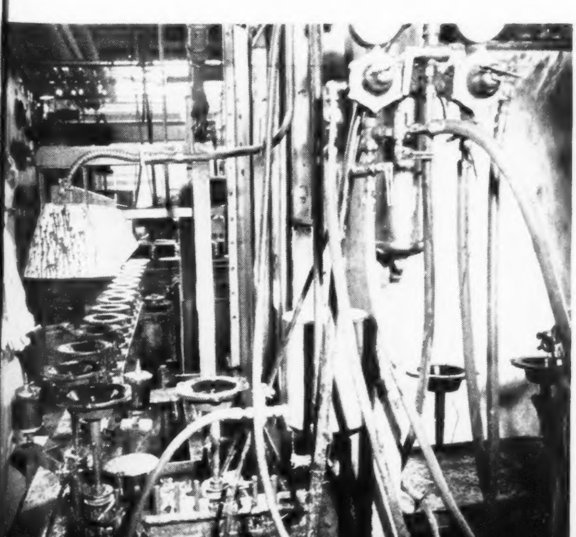
Automatic Spray Finishing at Goodyear Plant

IN RECENT years companies have been placing growing emphasis on new, more efficient production methods designed to step-up volume, cut operating costs, and improve quality control. With ever-increasing competition for a share of today's market, it is no longer possible for a company to be content with old methods that may still be doing an "average job." There is a movement toward automation by necessity.

A good example of this trend toward automation, and its ensuing benefits, is found in the installation of automatic spray painting facilities at the Goodyear Tire & Rubber Co.'s molded and extruded rubber products plant at St. Mary's, O. A wide range of products for mechanical and industrial uses is manufactured at this plant, and some items designed for certain applications are given a protective coat of elastic enamel before shipment.

Hand-spraying methods were formerly used to apply this finish coat. In the Fall of 1955, however, an automatic spindle-type spray painting machine with complete spraying accessories, produced by Binks Mfg. Co., Chicago, Ill., was installed as part of the plant's modernization program. Prior to installation of the Binks equipment, the finishing of eight-inch round rubber and steel inserts, used to connect automobile heaters with the heater blower, was done in three separate booths, where the pieces were sprayed on manually operated turntables. The inserts are made of steel plate which is cleaned by sand-blasting, coated with rubber cement, and molded to a rubber strip compound. The enamel coating rustproofs the steel reinforcing member.

The Binks spindle-type spray painting machine, which includes a dynaprecipitor water-wash spray booth, utilizes an endless conveyor chain, two inches in diameter, with spindles about 15 inches apart. The conveyor moves on a rectangular track around the outside of the spray booth, entering and leaving the spray area at the front of the booth through small doors in each side. A special feature of this production line is a battery of eight infrared drying lamps which dry the freshly enameled inserts as they emerge from the spray area of the booth. Figure 1 shows a part of this installation.



Three paint stations equipped with Binks model 21 automatic spray guns are located in the spray area. The inserts are trucked to this area, and a single operator, stationed at the rear of the booth, places one insert on each spindle as the moving conveyor passes in front of her. As the conveyor moves into the spray booth, a guide wheel on each spindle engages a small belt mounted on the floor of the booth, which causes the spindle to rotate rapidly as it passes the three automatic spray guns. As the rotating spindle approaches the area in front of the guns, a small dog engages a spray starting mechanism on the guns, setting them in action. (See Figure 2.) After passing a set point near the other side of the booth, the dog disengages, the spray stops, and the conveyor carries the inserts on out of the booth. The three guns are preset at different angles to insure positive coverage of each type of sprayed piece. This continuous cycle enables one operator to spray 1,500 inserts an hour.

It is reported that installation of the Binks automatic spray equipment enabled this Goodyear plant to reduce the number of workers required for this particular finishing operation from nine to three. More uniform coatings are obtained, and the drying time is always constant. Another improvement is the exhaust efficiency of the dynaprecipitor spray booth in removing paint overspray from the air.

Mechanical Separation of Fiber In Rubber Reclaiming

New Process Offers Salable By-Product Simultaneously with High-Quality Reclaimed Rubber

By ROBERT M. BOYLES and D. J. SULLIVAN

Midwest Rubber Reclaiming Co., East St. Louis, Ill. *Sturtevant Mill Co., Boston, Mass.*

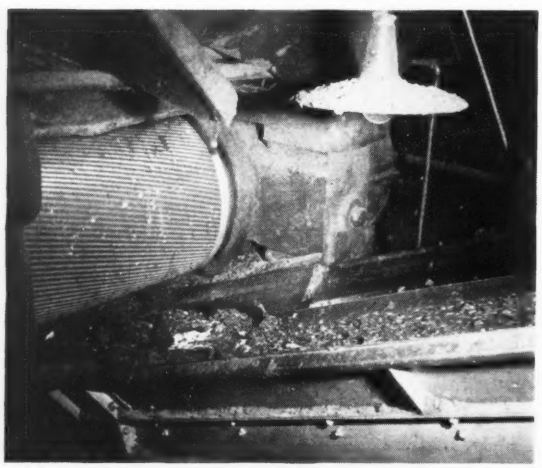


Fig. 1. Pieces of auto tires leaving cracker roll on conveyor belt

LESS than 15 years after Charles Goodyear discovered the vulcanization of rubber with sulfur, the demand for rubber products became so great that natural rubber facilities were inadequate, and the rubber pioneer realized the importance of reclaiming and reusing worn-out rubber articles. Thus he followed his 1839 discovery with an 1853 patent involving the grinding and mastication of scrap rubber for reuse in mixing with the raw material.

The next important development was made in 1858 by Hiram L. Hall, who heated ground waste vulcanized rubber in open steam, thus introducing essentially what is known today as the heater or pan process.

In those early days, however, scrap rubber suitable for reclaiming was limited to fiber-free material; whereas today the biggest tonnage contains a large proportion of fiber.

Early attempts at removal of fiber by mechanical means were only partly successful so that removal by chemical means became general. In the 1880's N. C. Mitchell was granted a series of patents on the acid process, a two-step process: first, defibering with acid, and, second, devulcanizing in a heater.

In 1899 A. H. Marks patented the alkali digester process which simplified reclaiming to a single step: defibering, desulfurizing, and devulcanizing with dilute caustic solution under heat and pressure.

Then in 1913, D. A. Cutler patented the use of zinc chloride as a defibering agent. Other processes have since been introduced, but most reclaim is still being made today by the digester process, mostly with metallic chlorides as defibering agents (because of the prevalent mixed elastomer scrap).

Mechanical Fiber Separation

The present article relates to a commercial method now in successful use on a large scale for mechanical separation of the fiber from scrap tires with essentially complete recovery of the rubber portion for reclaiming. In the older chemical digestion methods which the newer mechanical operation supersedes, the fibers were destroyed.

This method about to be described is being used by one of the nation's largest rubber reclaimers, Midwest Rubber Reclaiming Co., at its main plant in East St. Louis, Ill. This method not only removes the undesired fibers from the rubber, but it also reclaims the fibers themselves, which are in turn sold as a valuable by-product to oil drilling contractors, athletic field-equipment manufacturers, automotive insulating material makers, and to packing and stuffing dealers. The rubber portion is devulcanized, processed, and sold in slab form as a raw material for use in making rubber goods, with or without admixture with new rubber.

Rubber to be reclaimed arrives at the Midwest Rubber plant by freight or truck. This rubber consists mainly of passenger, truck, and bus tires. Auto tires are fed, whole, into cracker rolls which tear and cut the scrap into pieces with a maximum size of but a fraction of an inch. Four such crackers are used in the East St. Louis plant, mounted on a common shaft and driven by a thousand-horsepower synchronous motor. Truck and bus tires are too large to be fed directly into the cracker rolls; so they are halved on a semi-automatic splitter, designed specifically for the reclaiming industry, which grips and rotates the large tires against a stationary blade.

After this tearing, crushing action, the scrap is carried by a conveyor to vibrators. (See Figure 1.) While the ground-up scrap is on the conveyor, an operator removes the bead wires which have been stripped of rubber. At the vibrator screen the smaller sizes of scrap are air blown to storage bins, and the oversize material is recycled through the cracker roll for further tearing and cutting.

On the way to the storage bins the ground scrap is carried over a continuous weighing belt and under magnetic pulleys along the route. From the storage bins the fine rubber is screened, with oversizes being reprocessed in a disintegrator in which the material is further crushed and stripped. The discharged material is then blown by air to a Sturtevant air separator,[1] which, by centrifugal force, separates as much of the fibrous material from the rubber as is possible.

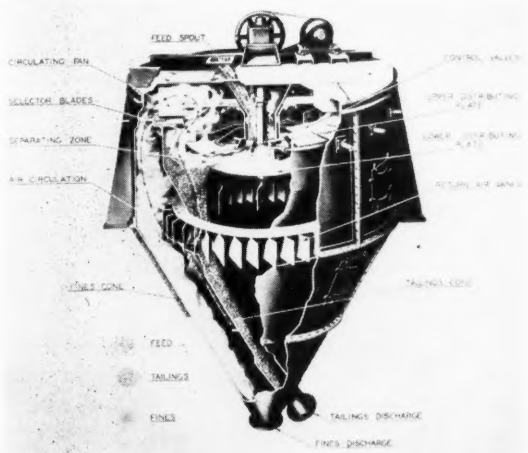


Fig. 2. Schematic inner view of Sturtevant Whirlwind air separator

Sturtevant Air Separator

Upon entering the Sturtevant air separator, the material passes down a chute which delivers it on to the center of a revolving, distributing plate which literally shoots the material off its outer edge in a thin, even, horizontal circular spray. The upper fan whirls and sucks the fiber material upward through the large top opening of the inner casing, while the secondary lower fan, running very close to the opening, whirls the upcoming material, centrifugally forcing the predominately rubber material, away from this opening, baffling and forcibly batting away such of this material as attempts to pass up and out of the unit. Figure 2 is a cut-away view of the Sturtevant air separator, and Figure 3 is one view of such a separator installed at the Midwest plant.

By the exact regulation and control of centrifugal force and air currents, one counteracting and overbalancing the other, simple adjustments allow the selection of almost any desired separation of fiber and rubber fractions.

[1] Sturtevant Mill Co., Boston, Mass.

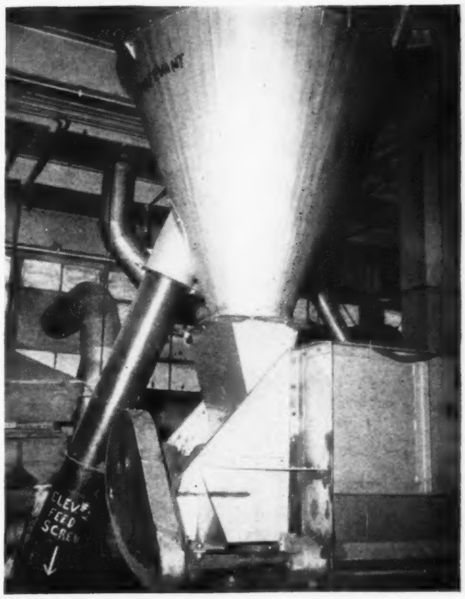


Fig. 3. One view of Sturtevant air separator in Midwest Rubber Reclaiming Co. plant

The fibrous material is diverted to beaters where entrapped fine rubber is removed, and the fiber is ready for garnetting and baling for sale.

Classification Table

The rubber, with a minimum of fibers, is carried to further processing at a classification table or specific

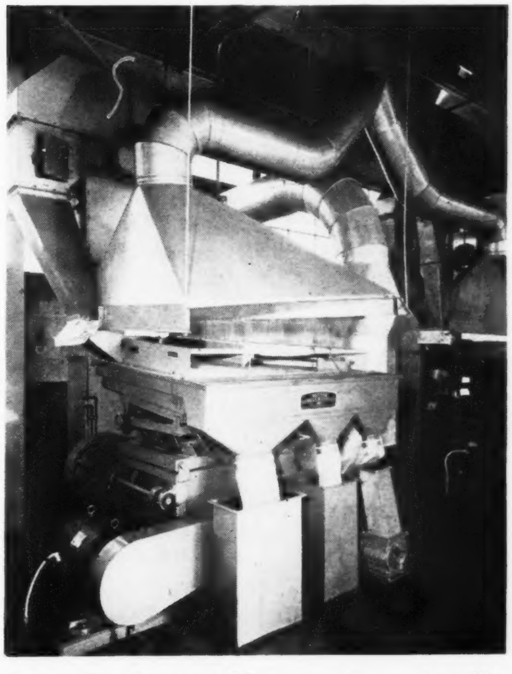


Fig. 4. Classification table or specific gravity table used for further separation of rubber and fiber

gravity separator[2] having a reciprocating porous deck, slightly inclined, forming the table top. Controlled air delivered through this deck stratifies the particles according to weight. Heavy rubber particles remain in contact with the vibrating deck and are conveyed to the higher edge. Fiber particles, suspended by the air stream, flow by gravity to the lower edge of the table. The intermediate weight rubber-and-fiber particles occasionally contact the deck surface and are then discharged at an intermediate point for reprocessing through the disintegrator and Sturtevant air separator. The resultant fibers are diverted to the beaters with the fibers channeled there by the Sturtevant separator. Figure 4 is a view of the classification table.

Process Advantages

The fiber-free rubber is then finely ground and mixed with chemicals and oils for devulcanization (or depolymerization, which it really is) in horizontal autoclaves.

With the Sturtevant air separator, Midwest can process up to 5,000 pounds of feed an hour and has been so doing since the separator's full utilization. No maintenance problems have occurred on the unit, and rapid inspections, which are possible simply by removing a door on the side of the air separator, show that no maintenance problems appear to be in the offing.

By replacing the chemical fiber separation process with a successful mechanical separation, Midwest has rid itself of air, water, and chemical pollution problems, recurring chemical additive costs, and excessive water costs that were inherent in the chemical digestion method, which left a chemical residue sludge that had somehow to be discarded. To the savings Midwest has added fiber as a by-product and achieves a high yield of devulcanized rubber thanks to the elimination of losses inherent in the digester process.

The new system was installed in 1952; in 1953, experiments were conducted to determine the best methods of operation, and in 1954, 1955, 1956, and into 1957 the method has proved itself. There have been no maintenance problems on the new central piece of equipment, no downtime for cleaning or repairs, while, on the other hand, benefits have accrued, owing to worker comfort resulting from better working conditions.

[2] Sutton, Steele & Steele, Dallas, Tex.

Viton A

(*Continued from page 254*)

OS-45 (Figure 4C). Stocks containing mineral fillers are superior to those containing black fillers in resistance to OS-45, hydraulic fluid. Iceberg clay is the best among the mineral fillers; while precipitated whiting is the poorest.

TURBO OIL 15 (Figure 4D). None of the fillers have any outstanding effect on the resistance of Viton A to this fluid. Small changes however, which may be important in certain applications, can be brought about through the use of the proper filler.

Summary and Conclusions

Viton A is inherently a high-temperature, fluid-resistant type of elastomer. Compounding studies were initiated to determine the effect of various types of fillers on the original physical properties, the heat and the fluid resistance of this elastomer. The fillers studied were MT black, FEF black, precipitated whiting (Super Multiflex), blanc fixe, calcined clay (Iceberg clay), precipitated hydrated silica plus low molecular weight silicone oil (Hi-Sil 233/LM-3), and hydrated calcium silicate (Silene EF). Twenty-volume loadings of all of these fillers have been compared as well as 20-, 40-, 60-, 100-, and 140-volume loadings of MT carbon black.

Fillers have the following effects on Viton A:

1. All the fillers studied increase modulus, reduce elongation, and increase the hardness of A vulcanizates. The mineral fillers produce harder, higher modulus stocks than the MT or FEF carbon blacks. Stocks containing Super Multiflex or blanc fixe have the lowest compression sets.

2. Increasing amounts of MT carbon black or 20-volume loadings of the other fillers studied contribute very little to the excellent heat resistance of Viton A vulcanizates, as judged by aging stocks 14 days at 450° F.

3. Proper filler loadings can make a marked improvement in the resistance of Viton A vulcanizates to various fluids, as judged by volume swell measurements and retention of physical properties after immersion. Compounds containing the various fillers vary widely in their resistance to the different fluids. Screening tests to determine the most suitable type of filler for use in a particular fluid are necessary.

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NEWS of the

RUBBER WORLD

Stockpiling of strategic materials, including natural rubber, is to be reviewed by a new civilian commission to be appointed by Defense Mobilizer Gordon Gray. A three-year instead of a five-year supply of such materials will be adequate for any future war, the Pentagon has decided. The report and recommendations are due in six months.

Rubber and chemical industries will have much at stake in Reciprocal Trade Agreements Act debate in next session of Congress. While certain domestic industries suffering from cheap imports want more tariff protection, other industries with foreign investments or exports favor more trade with the rest of the free world.

Department of Labor proceeding with tire industry wage study under Walsh-Healey Act. Industry management urges investigation of the Act as outmoded under present-day economic conditions.

National Tire Dealers & Retreaders Association takes strong stand on misleading advertising and asks manufacturers and distributors to clarify different tire grades in the minds of the tire-buying public.

General Tire & Rubber Co. and El Paso Natural Gas Products Co. placed the first privately constructed and completely integrated styrene-butadiene synthetic rubber plant in operation in Odessa, Tex., on October 18. The butadiene supply of 50,000 tons will be used by both General Tire and United Rubber & Chemical Co. General Tire will use 70% of the SBR and market the remainder.

Goodyear's P. W. Litchfield urges more synthetic rubber production abroad to avoid a shortage of natural rubber in the United States in the early 1960's. He thinks additional capacity abroad is preferable to more capacity in this country and suggests American aid, if needed, to enable other nations to expand their facilities.

American Cyanamid Co. dedicated a new $2,000,000 Research Center at Bound Brook, N. J. Thermatomic Carbon Co., division of Commercial Solvents Corp., and R. T. Vanderbilt Co. have doubled the capacity for Floform (pelleted) Thermax carbon black. Cary Chemicals, Inc., opened a new PVC plant.

Local rubber group meetings produced programs on color in New York; rubber in autos in Chicago; on silicones at Fort Wayne; natural rubber at Buffalo; reclaimed rubber in Boston; non-black reinforcers in L. A.; and on German progress in plastics at the Ontario Group.

MEETINGS and REPORTS

New York Group Honors 28 Past Chairmen; Technical Program on Color Well Received

The New York Rubber Group at its meeting on October 4 at the Henry Hudson Hotel, New York, N. Y., paid special tribute to 28 past chairmen, 21 of whom were present at the meeting to receive special scrolls thanking them for their services, from A. A. Somerville, Pawling Rubber Corp., the chairman for the organizational meeting of the Group in January, 1928.

The afternoon technical program featured, first, a sound color film and color slides entitled "This Is Color," by Interchemical Corp., and a discussion of the salient properties of color, by S. L. Wurzburg, Jr., of the commercial development department of Interchemical. V. H. Vodra, technical director, Wooster Rubber Corp., completed the technical program with a comprehensive paper, "Designing Colored Rubber Compounds."

The evening dinner program at which the ceremonies honoring the past chairmen took place was concluded with an inspirational talk by Tennyson Guyer, president of the International Platform Association and director of public relations of Cooper Tire & Rubber Co., Findlay, O.

The Technical Program

The color film, "This Is Color," by animation and practical demonstrations established the principle that color is not an intrinsic property of physical objects. Color depends on light and the nature of the human eye, and colors change as the nature of light (daylight, fluorescent light, tungsten filament light) changes, it was pointed out. One scene showed the five principal colors of the spectrum and the changes which take place when the light source is varied.

Refraction, reflection, transparency, opacity, subtractive mixtures, and additive mixtures, all these phenomena were explained in the film, but essentially in non-technical terms. These phenomena are related to the behavior of light in industrial enamels, in textile colors, in four-color process printing, and in color television. The film demonstrated how color can be predicted and controlled.

Mr. Wurzburg was technical director for the film; while Arthur C. Hardy, D. F. Farnsworth, and Ralph M. Evans served on the advisory committee.

In discussing the design of colored rubber compounds, Mr. Vodra covered elastomers, resins, activators, white pigments, fillers and reinforcing agents, softeners, antioxidants, accelerators and vulcanizing agents, color availability, the effects of sunlight and ultra-violet light on colors, color migration, etc., as factors in building practical colored rubber compounds.

It was emphasized that in order to make the cleanest, brightest compounds, one should use the cleanest, lightest rubbers possible. Organic reinforcing resins should also be as light in color as possible commensurate with price, and the uniformity of color of every compounding ingredient used is important.

The most common white pigments used in rubber are titanium dioxide, titanium-calcium sulfate, zinc oxide, and lithopone. Through the use of whiter clays, less titanium dioxide and less color are required in the final colored compound. Softeners with a high degree of chemical saturation and the least discoloring accelerators and antioxidants are essential in compounding colored rubber.

Mention was made also of the availability of inorganic colors sold pure as toners or precipitated on inert materials as lakes. Organic colors are also available as toners and lakes, but masterbatches in rubber and in low molecular weight polyethylene are particularly useful for accurate compounding.

The problems of color migration and color changes due to heat and light as well as from detergents and greases were reviewed. It was emphasized that every shipment of color is matched against a control in a cured compound.

In conclusion, Mr. Vodra made the point that it is impossible to remove dirtiness which is put into a compound through off color ingredients. The lightest, cleanest, brightest materials must be used if clean, crisp-appearing products are to result. The sulfur content of the compound should be kept low, and a most careful selection of coloring agents to be used is necessary.

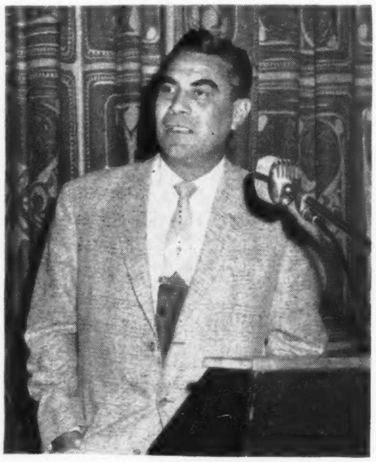
Numerous slides and exhibits of colored rubber products of Wooster Rubber Corp. were used to illustrate this talk.

Past Chairmen's Night

Following dinner Group Chairman H. J. Due, St. Joseph Lead Co., expressed his appreciation to the officers and directors of the Group for their help during the year. He paid special tribute to the efforts of R. B. Carroll, R. E. Carroll, Inc., chairman for the summer outing, and those of L. J. Koch, Westwood Chemical Co., chairman, and B. A. Wilkes, Godfrey L. Cabot, treasurer, for the golf outing.

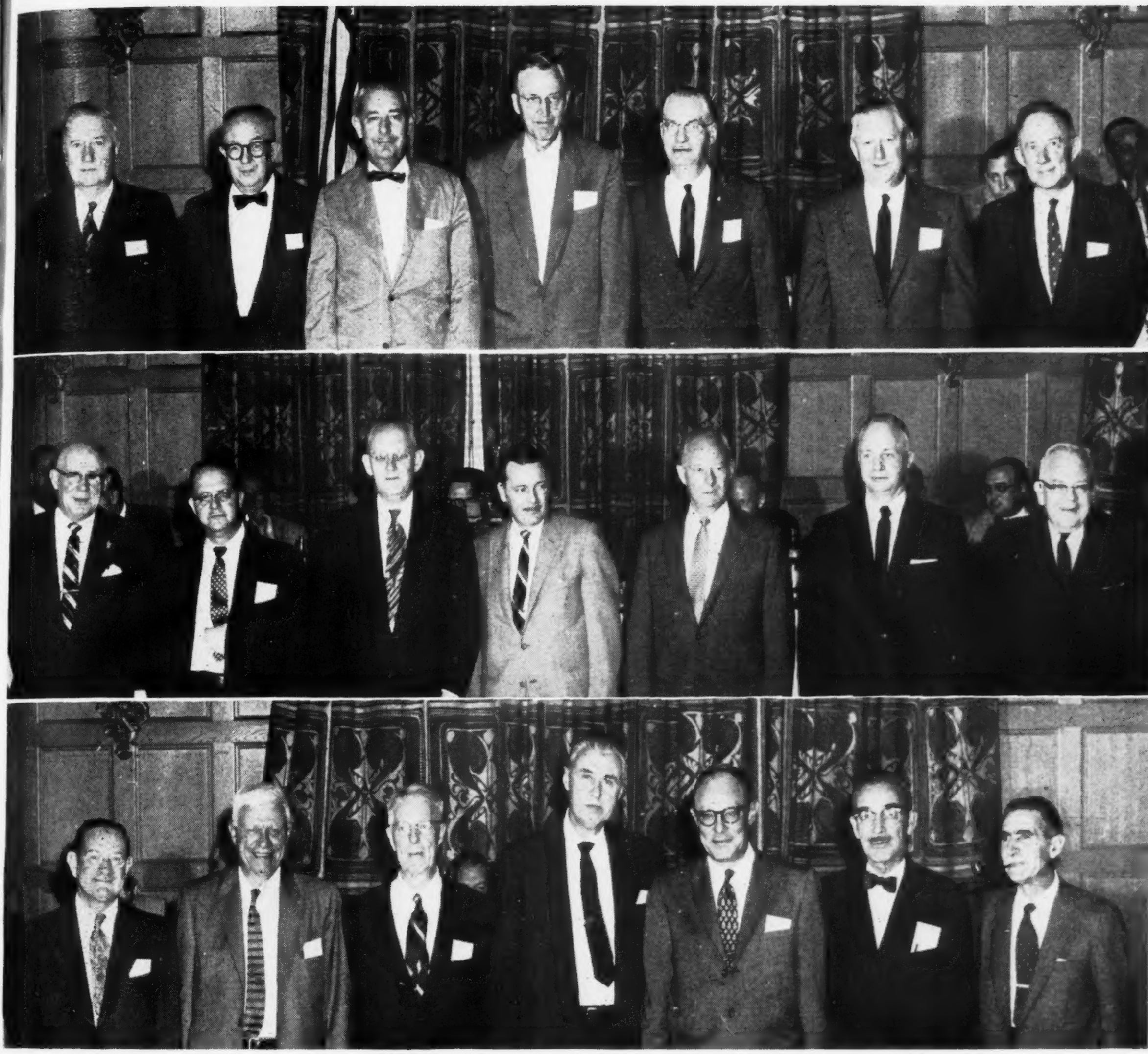
It was announced that enrollments were still being accepted for the course in Basic Elastomer Technology, which began October 7. The members were reminded of the Christmas party to be held this year at the Latin Quarter.

The report of the nominating committee for officers and directors for 1958 was given as follows: for chairman, C. V. Lundberg, Bell Telephone Laboratories; vice chairman, R. B. Carroll; secretary and treasurer, M. E. Lerner, *Rubber Age;* directors, L. C. Komar, Titanium Pigments Corp.; L. J. Koch; D. B. Doherty, Godfrey L. Cabot; R. M. Glidden, Ames Rubber Co.; and sergeant-at-arms, F. J. Raba, Triangle Conduit & Cable Co., Inc. There were no further nominations from the floor, and the candidates were elected by a unanimous voice vote.



Tennyson Guyer

A. A. Somerville receives special citation from H. J. Due



Past chairmen present at the meeting, left to right (top row), W. A. Gibbons, B. R. Silver, J. Miscall, K. J. Soule, J. H. Ingmanson, G. J. Wyrough, P. P. Murawski; (center row), M. R. Buffington, G. N. Vacca, S. M. Martin, Jr., G. H. Provost, J. Breckley, J. S. Corrigall, D. E. Jones; (bottom row), S. Collier, F. S. Conover, C. R. Haynes, F. E. Traflet, C. A. Bartle, J. P. Coe, and R. D. Gartrell

Mr. Due then introduced Mr. Lerner, chairman of the scroll committee, who, following a brief discussion of reasons and plans for "Past Chairmen's Night," introduced Dr. Somerville to make the presentation of the scrolls to the past chairmen present at the meeting.

Dr. Somerville described some of the incidents that occurred in 1927 and 1928 that led to the formation of the New York Rubber Group, at its organizational meeting held January 11, 1928, at the Beaux Arts restaurant in New York. Although he acted as chairman for the first meeting, Dr. Somerville said the assemblage lost no time in unanimously electing W. A. Gibbons as the first chairman of the Group. Among the guests of honor at this 1928 meeting were Francis R. Henderson, president of the Rubber Exchange of New York, and H. L. Fisher, chairman of the Division of Rubber Chemistry at that time.

The complete list of past chairmen of the Group and the years each served as chairman follows: Dr. Gibbons, 1928-29; W. L. Sturtevant, 1930; W. H. Whitcomb 1931 (deceased); J. P. Coe, 1932; A. R. Kemp, 1933; C. J. Wright, 1934; B. R. Silver, 1935; R. D. Gartrell, 1936; J. Miscall, 1937; C. A. Bartle, 1938; A. H. Nellen, 1939; C. R. Haynes, 1940; K. J. Soule, 1941; F. E. Traflet, 1942; J. H. Ingmanson, 1943; F. S. Conover, 1944; H. E. Outcault, 1945; G. J. Wyrough, 1946; S. Collier, 1947; J. E. Waters, 1948; P. P. Murawski, 1949; D. E. Jones, 1950; M. R. Buffington, 1951; J. S. Corrigall, 1952; G. N. Vacca, 1953; J. Breckley, 1954; S. M. Martin, Jr., 1955 and, G. H. Provost, 1956.

The accompanying photograph shows the 21 past chairmen present at the meeting. Expressions of regret from those unable to attend were read by Dr. Somerville.

The current chairman, Mr. Due, then presented a special citation to Dr. Somerville for acting as temporary chairman of the New York Group at the time of its formation, for his work in connection with the formation and organization of the Group, and for his cooperation throughout the years whenever called upon for help with regard to the activities and affairs of the New York Rubber Group.

Group Secretary R. G. Seaman, RUBBER WORLD, introduced Dr. Guyer, who entertained those present with his infectious wit and humor while at the same time underscoring some basic principles of human behavior.

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To perforate, or not to perforate—that is the question. What is *your* reaction?

Signal Corps Schedules 25 Wire and Cable Tech Talks

Twenty-five papers on "Technical Progress in Communication Wires and Cables" have been scheduled for the sixth annual symposium of the communications department of the U. S. Army Signal Engineering Laboratories, Fort Monmouth, N. J., to be held at the Berkeley-Carteret Hotel, Asbury Park, N. J., December 3-5. Registration will begin December 2.

Titles of technical papers to be presented and their authors have been reported as follows:

December 3, morning—**"Foamed Polyethylene Coaxial Cables,"** G. R. Karlson and C. C. Camillo, Amphenol Electronics Corp.; **"Low Loss Coaxial Cable for Microwave Service,"** J. Agrios, Royal Electric Co. and I. T. Stoneback, Federal Telecommunication Laboratories; **"High-Temperature Aircraft Wires,"** H. L. Wilson and W. F. Horstman, General Electric Co.; **"Electrical Testing of Polyvinyl Chloride Formulations,"** W. E. Koerner, R. H. Munch, J. R. Taylor, and M. W. Williams, Monsanto Chemical Co.; **"Stabilization of Vinyl Insulation,"** J. G. Hendricks and N. L. Cooperman, National Lead Co.

December 3, afternoon—**"REA Specifications for Wire and Cable for Direct Burial on Rural Telephone Systems by REA Borrowers,"** C. R. Ballard, F. F. Farnsworth, and A. L. Richey, Rural Electrification Administration, U. S. Department of Agriculture; **"Buried Rural Telephone Distribution Systems,"** A. C. Benner, J. W. Davis, D. G. Wilson, Southern Bell Telephone Co.; **"Communication Underground Distribution Plant in Urban Areas,"** C. H. Elder, Illinois Bell Telephone Co.; **"Experiences with Self-Supported Plastic Telephone Cable,"** M. O. Brown, General Telephone Co. of Illinois; **"Cable Splicing Goes Modern,"** W. C. Kleinfelder, Bell Telephone Laboratories; **"Field Reliability of the Sheer-Type Sealing Connector,"** E. W. Bollmeier, Minnesota Mining & Mfg. Co.

December 4, morning—**"Operation Deep Freeze,"** E. W. Most, Bureau of Yards & Docks, U. S. Navy; **"Extrusion of Fast-Curing Neoprene Wire and Cable Compounds,"** L. Simons and C. E. McCormack, E. I. du Pont de Nemours & Co., Inc.; **"Compounding for Heat-Resistant Insulations and Jackets,"** A. C. Rowley, R. T. Vanderbilt Co.; **"Predispersed Accelerators in Rubber Compounds,"** J. Ware, Ware Chemical Corp.

December 4, afternoon—**"New Developments in Hi-fax Coverings for Wire and Cable,"** W. P. Acton and W. O. Bracken, Hercules Powder Co.; **"The Effect of Stock Temperature on the Physical Properties of Polythene Insulation for Linewire,"** J. A. Durno, Canadian Industries, Ltd.; **"Thermal Embrittlement of Polyethylene,"** V. L. Lanza and J. H. Heiss, Bell Labs; **"The Interrelationship between Density and Dielectric Strength of High-Pressure Polyethylene for High-Voltage Applications in Insulated Wires,"** A. S. Silver, Royal Electric Corp.; **"High-Voltage Aspects of Extruded Polyethylene Insulations,"** M. M. Suba, Bakelite Co.; **"Evaluation of Carbon Black Dispersions in Polyethylene,"** R. M. Schulken, Jr., G. C. Newland, and J. W. Tamblyn, Tennessee Eastman Co.

December 5, morning—**"Bulk Handling of Polyethylene in Cable Manufacturing,"** M. G. Dinsmore, Jr., Western Electric Co.; **"Techniques for Insulating Wire and Cable with Silicone Rubber,"** D. C. Youngs, B. J. Badamo, and M. N. Culver, Dow Corning Corp.; **"Controlled Pressure (Valve) Extrusion,"** B. H. Maddock, H. J. Nalepa, and B. Zurkoff, Bakelite; **"The Extrusion of 'Teflon' 100 X Perfluorocarbon Resin, a New Melt Extrudable Material for Wire Insulation,"** R. E. Stabler, Du Pont.

The symposium committee is headed by Howard L. Kitts, chief of the Outside Plant Branch of the Communications Department. The other committee members are Howard F. X. Kingsley, co-chairman; Ray Blain, U. S. Army Signal Communication Engineering Agency; C. T. Wyman, Bell Telephone Laboratories; George Hamburger, Copperweld Steel Co.; Vincent McBride, Plastic Wire & Cable Corp.; E. J. Merrell, Phelps Dodge Copper Products Co.; and M. C. Gaine, Monsanto Chemical Co.

Tlargi Hears Ralph Wolf and Alonzo Baker

Ralph F. Wolf, Columbia Southern Chemical Corp., spoke on "The Use of Non-Black Pigments in Rubber" before 90 members and guests at the afternoon technical session of The Los Angeles Rubber Group, Inc., at the Biltmore Hotel, Los Angeles, Calif., October 1. The dinner-meeting, attended by 260, was addressed by Alonzo Baker, professor of political science, College of the Pacific, who discussed "How Good Is America's Foreign Policy?"

Mr. Wolf pointed out that only a few of the non-black rubber pigment materials used have really widespread application. These are the clays, calcium carbonates, silicates, silica, and zinc oxide. Some non-black pigments are used for the reinforcement they impart, and others are inert materials utilized principally as diluents. Both classes are useful for modifying processing characteristics such as calendering or extruding properties of uncured stocks. A third class of non-black materials is those used to produce color.

Non-black reinforcing pigments include hydrated silica, calcium silicate, zinc oxide, precipitated calcium carbonates and, perhaps, hard clay. Silica, calcium silicate, and regenerated clay give the best tensile strength and highest modulus. These materials should be avoided where high elongation is desired, and ordinary calcium carbonates should be used instead. Resilience is usually inversely proportional to reinforcement.

Size and shape of filler particle play an important part in determining the hardness, tear, and flex resistance it imparts.

Precipitated silicas are outstanding for abrasion resistance because of their small particle size.

The diluent pigments used mainly to reduce costs include soft clay, ground whiting, barytes, blanc fixe, and talc.

The raw material sources and methods by which zinc oxide; precipitated carbonates, silicates, and silica; and ground carbonates and clays are produced were described in detail by Mr. Wolf. Also the physical properties imparted by each of these classes of pigments to both natural rubber and styrene-butadiene rubber were presented in a series of tables.

Dr. Baker, introduced by H. R. Erwin, manager of the West Coast plant of Midwest Rubber Reclaiming Co., listed the pluses and minuses of the foreign policy decisions made by the United States during the past ten years. On the plus side were such things as the Truman Doctrine, NATO, Marshall Plan, and the Eisenhower Doctrine. On the minus side were such decisions as Geneva Conference, not attaining a United Germany, and not allowing our newsmen to go into Red China.

Dr. Baker visualizes 75 to 100 years of leadership by the United States in the world and also said that he feels we will be able to spread humanitarianism throughout the world in this period.

Mr. Erwin also introduced Midwest Rubber personnel including Howard Painter, executive vice president and treasurer of the company. Prizes were donated by this company, which sponsored the meeting.

High Polymer Forum

The Eighth Canadian High Polymer Forum will be held at MacDonald College, Quebec, P.Q., May 12-14, 1958. This meeting is cosponsored at 18-month intervals by the National Research Council of Canada and the Chemical Institute of Canada and solicits papers on all aspects of polymer science.

Authors of papers are requested to write the program chairman, M. H. Jones, Department of Chemistry, Ontario Research Foundation, 43 Queen's Park, Toronto 5, Ont., Canada, giving title and authors. Abstracts of approximately 300 words will be required before April 30, 1958, for inclusion in the program. The annual forum banquet, to be held on May 12, will be addressed by Prof. G. Gee, of the University of Manchester, England.

Single or double rooms for male registrants will be available at $3.00 per person in the College dormitories, and reservations should be directed to E. B. Bagley, Central Research Laboratory, Canadian Industries Ltd., McMasterville, P.Q., Canada. Married couples and other registrants desiring accommodations off the campus may obtain rooms in conveniently located motels either by direct arrangement or through Dr. Bagley. Travel information and any other assistance may be obtained from the chairman of the Eighth Canadian High Polymer Forum, D. G. Ivey, Department of Physics, University of Toronto, Toronto, Ont., or from the secretary-treasurer, L. A. McLeod, research and development division, Polymer Corp., Ltd., Sarnia, Ont., Canada.

At Thiokol Technical Club meeting, *left to right:* Dr. Williams; Dr. Martin; L. B. Sebrell, International Latex Corp.; R. H. Gerke, U. S. Rubber; John M. Ball, Midwest Rubber Reclaiming Co.

Thiokol Club Hears Williams on SBR Gel

Ira Williams, director of research of J. M. Huber Corp., was the speaker at the October 10 meeting of the Thiokol Technical Club, held at the Thiokol Chemical Corp. laboratories, Trenton, N. J.

Speaking on "The Influence of Gel Formation in SBR Rubber," he discussed the general nature of SBR rubber, the formation of gel rubber in SBR, and various methods of controlling the amount of gel rubber formed.

Dr. Williams first noted that although SBR was essentially a linear polymer, there was considerable side-chain formation; and that although these side chains were of short length compared to the main polymer, one should not forget that they also could contribute to the general elastic character of SBR. For example, according to this speaker, there is a certain temperature range where hydrocarbons with only 10 or 12 carbons develop considerable elasticity.

Another factor that modifies the character of SBR, according to this research director, is the percentage of gel rubber in the SBR. Although initially SBR has a very small percentage of gel rubber, this can be varied by mechanical working, changing mixing temperatures, or the addition of various chemicals during mastication of the rubber.

Hot milling or prolonged milling, said Dr. Williams, considerably increases the proportion of gel rubber, which may go as high as 40%. Generally speaking, a high gel SBR rubber has a high modulus, low tensile strength, and low flex life, he said. While these are not usually desirable properties, an increase in the gel content does make for better extrusion and calendering operations. What is needed is to obtain the best balance between the gel content and the non-gel SBR for the type of product being produced.

In contrast to these physical processes that increase gel content, a lowering and control of gel formation can be obtained by the addition of well-known rubber chemicals to the SBR mix. For example, accelerators DPG and Monex[1] give a low gel content. He stated also that some age-resisters (Stabilite Resin[2] and Antioxidant 2246[3]) had a similar effect as do some commonly used chemical plasticizers.

Dr. Williams concluded with a discussion of the similarity between carbon black "bound" rubber and the usual gel rubber. The general effect is that as the surface area of the carbon black increases, so does its ability to form "bound" rubber or a gel-like mixture of carbon black and SBR.

S. M. Martin, of Thiokol, opened the meeting, and O. M. Hayden of E. I. du Pont de Nemours & Co., Inc., introduced the speaker.

[1]Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.
[2]C. P. Hall Co., Akron, O.
[3]American Cyanamid Co., rubber chemicals department, Bound Brook, N. J.

Fort Wayne Group Meeting

The Fort Wayne Rubber & Plastics Group held a dinner and meeting attended by 170 members and guests at the Van Orman Hotel, Fort Wayne, Ind., on September 26. A technical session, presided over by E. H. Smith, Bendix Products Division, featured a panel discussion on silicone rubber and the presentation of three papers: "New Materials in Silicones and Case Histories of Problems Solved with Silicone Rubber," by J. H. Lorenz, Union Carbide Corp.; a paper on recent developments in silicone rubber by J. C. Caprino, General Electric Co.; and a paper on several advantageous applications of silicone rubber by J. V. Fenner, Dow Corning Corp.

Mr. Lorenz reported that a new semipermanent mold release agent, based on Union Carbide resins is now available. This material, known as MR 22, is said to be effective in epoxy resin-glass and polyurethane foam-epoxy mold release. Another new product—fusible silicone rubber compounds—was designed to fill a need in the electrical field. These materials exhibit pressure-sensitive surfaces after any cure. One of the important properties of these new fusible compounds is the complete fusibility after any cure; thus, a mold cure, continuous vulcanization, hot air cure, or oven cure can be used, allowing the fabricator to use any convenient method such as molding, extruding, calendering, or solution coating. One of the major uses of these compounds will undoubtedly be in the form of tapes, either supported or unsupported.

Mr. Fenner cited two examples of currently successful applications which illustrate the advantages obtained through the use of silicone rubber in the development of a new product or in the improvement of an existing product. The first example, using Silastic 152, concerns the development of a silicone-rubber insulated instrument transformer, whereby the rubber selected showed excellent electrical properties and ability to withstand high temperatures for extended periods of time. It also possessed good physical strength and good confined heat stability. An improved silicone rubber, Silastic 50, which had better physical and handling properties, was subsequently developed.

The second example cited illustrated the fulfillment of a need of a rubber with good physical strength, good resistance to oil, and low cost for use as oil seals in automatic transmissions. The problem was solved by the development of Silastic 432 Base, which consists of 80% silicone gum and 20% reinforcing filler, and to which additional filler and additives could be added to make a wide variety of compounds for individual requirements. Also reported was the development of a new fluorosilicone rubber, Silastic LS-53, which has temperature stability and high fuel and oil resistance; and other compounds such as Silastic 916 and Silastic RTV 501.

In the third paper Mr. Caprino presented some recent developments in silicone rubber technology—high-strength silicone rubber, specially designed sponge compounds, and room-temperature vulcanizing compounds. Applications requiring the advantages of silicone rubber were refrigerator frost preventer, turbine boot, and silicone-rubber tape-wrapped power cable. The high-strength silicone rubber is called SE-555; the sponge compounds are SE-546 and SE-547; and room-temperature vulcanizing compounds were also described.

The next Fort Wayne meeting will be held December 5 at the Van Orman Hotel, Fort Wayne, Ind.

New Estimate of Rubber Use In Autos Given at Chicago

The fall dinner-meeting of the Chicago Rubber Group was held at the Furniture Club in the Furniture Mart, Chicago, Ill., on October 11, with some 200 members and guests present.

Reports were presented by various committee chairmen, including one on the educational course started by the Group several years ago. The registration for the present course totals 45 persons, a substantial increase in number over the registration for previous courses. It was also announced that the membership of the Group now amounts to 658.

Following dinner, W. J. Simpson, managing engineer, organic materials laboratory, Chrysler Corp., spoke on "The Use of Rubber in the Automobiles of Today." Mr. Simpson made an estimate of the number and the location of rubber parts used in manufacturing a modern automobile, gave some idea of the function these parts perform, described methods for specifying the quality of automotive rubber parts, and discussed typical defects found in incoming shipments of these products.

It was estimated that the typical 1957 automobile had 447 body and chassis parts, including five tires, weighing 222 pounds, plus 104 cement and sealer and sound deadening parts weighing 150 pounds, for a total of 551 parts weighing 372 pounds. In 1949, the automobile of that year had 374 body and chassis parts, including tires, weighing 221.9 pounds. The use of the lighter tubeless tires is mainly responsible for preventing an increase in the total weight of rubber per car; however, there is also a decrease in the average weight of automotive rubber parts used in today's cars.

The four major functions performed by rubber parts in the modern automobile were given as: (1) reducing or isolating vibration; (2) sealing against air, fluids, and contaminants; (3) insulating electrical conductors in the car; (4) acting as a binder for friction material, adhesives, sealers, and deadeners.

The speaker said that the reasons for attempting to cover the properties of all rubber parts by complete specifications were to insure the selection of material that will perform adequately, to make certain these materials are commercially available, to prevent changes in material without the users' knowledge, to maintain shipments of parts at uniform quality, to correlate design requirements with material properties, and to take advantage of developments and advances in rubber technology. Reference was made to the 10-R Standard of the Society of Automotive Engineers and the D 735 Standard of the American Society for Testing Materials used by all major automotive companies in assigning material specifications for many types of rubber parts.

A list of typical visual defects found by the automobile manufacturers in shipments of automotive rubber parts was given also in order to provide some idea of the reasons for rejection of certain shipments.

Not only are automotive vehicles using more and more rubber parts, but as the requirements for these parts become more stringent owing to more severe service conditions, applications for the new fluororubbers, polyurethanes, etc., will occur, Mr. Simpson declared in his concluding remarks.

NCRG Holds Joint Meeting with WCMRG

The Northern California Rubber Group held its second annual Past Presidents Night on September 19 at the Berkeley Elks Club, Berkeley, Calif., where it was host to 30 members of Western Chemicals Market Research Group. In attendance and guests of honor were 10 past presidents of the Group, including: Russ Kettering, Oliver Tire & Rubber Co.; Lynn Shafer, American Rubber Mfg. Co.; George Farwell, Goodyear Rubber Co.; Ross Morris, Mare Island Naval Shipyard; Fred Swain, R. D. Abbott Co.; Don Good, American Rubber; Jack Watson, Goodyear Rubber; Jos. Hollister, Mare Island Shipyard; J. Stall, retired; and Halsey Burke, Burke Rubber Co. Past presidents not in attendance were Herman Jordon, Leonard Boller, Neil McIntyre, and Leonard Evans (deceased).

Ross Morris, chairman of the committee on education, announced that many applications were being received for the Leonard Evans Memorial Lecture Series in "Elementary Rubber Technology." The course, consisting of 10 weekly lectures, began September 24, 7:30 p.m. in Room 23, Dwinelle Hall, University of California, Berkeley, and will conclude on November 26. It is a non-credit course, offered on a one-time basis, to be repeated and/or expanded as demand and situation require. The fee of $10.00 is for non-students of the university.

"Economics of the Rubber Industry" was the title of the talk presented at the joint meeting by Howard Heilman, consulting chemical engineer and economist. A summary of his speech follows.

The rubber industry is an example of a mature industry, in which the days of large profit margins on products representing new and striking innovations are behind. Markets for rubber products are generally characterized by rigorous competition for both large- and small-volume items.

Butadiene polymers will remain king for many years to come, though the prices may increase slightly. Butadiene monomer price is probably going to increase in the future, following the price of crude oil, and the present price of styrene represents a forced low and may increase a full cent or more a pound in the future. The future of butyl rubber is brightening owing to the development of butyl tires, but development in natural and/or synthetic rubber tires will keep pace so that butyl tires will probably never top the market.

Synthetic natural rubber production is dependent upon the availability of high-purity isoprene, the price of which will probably average 7-8c a pound higher than the average price of raw materials for styrene-butadiene polymers. This high raw-material cost for synthetic natural rubber means that natural rubber will be able to compete successfully with it for many years. Present predictions are that natural rubber will not be competitive with butadiene polymers for 7-10 years.

The future growth of the rubber industry will be dramatic, but competitive, with the growth rate exceeding 5% per year. Indications are that in the foreseeable future the consumption of synthetic rubber will never exceed 70% of the total for new rubber consumption. Despite this fact, Mr. Heilman believes to be very pessimistic the predictions that by 1961 there will be a burdensome excess of synthetic rubber on the U. S. market.

In addition to the business and technical sessions of the meeting, there were a cocktail hour and a dinner.

The next meeting of the group will take place on October 10 at Berkeley Elks, with Ralph F. Wolf, Columbia-Southern Chemical Co., speaking on "Use of Non-Black Pigments in Rubber."

Prince Philip Confers Medal at AIP Dedication

On behalf of the governing board of the American Institute of Physics, Prince Philip of England conferred the first Karl Taylor Compton Medal of the Institute on George Braxton Pegram, vice president emeritus of Columbia University, on October 21.

The ceremony took place in conjunction with the dedication of the Institute's new building at 335 E. 45th St., New York.

Prince Philip conferred the Compton Medal and visited this national headquarters for research in physics, publication, and education because of his deep personal interest in science and the advancement of knowledge in this field.

Frederick Seitz, chairman of the Institute's governing board and chairman of the department of physics at the University of Illinois, presided at the ceremonies, introduced Prince Philip, and described the work of the AIP.

The purposes and program of the Institute were outlined in some detail by Elmer Hutchisson, director; and Henry A. Barton, associate director, delivered a citation concerning the accomplishments of Dr. Pegram.

A feature of the dedicatory exercises was a tribute to the late Karl T. Compton by George R. Harrison, vice president of Massachusetts Institute of Technology.

The new headquarters of the AIP provide three times the amount of space formerly available to the Institute in its previous home at 57 E. 55th St., New York. The move was made necessary by the expansion of the number and activities of physicists during and after World War II. Staff members during the past 14 years have grown from 25 to 65, membership in the Institute has more than doubled, and the number of journal pages published each year has risen four times.

Rubber Chemicals Topic Before Boston ACS Section

The first meeting of the 1957-58 season for the Elastomer & Plastics Group, Northeastern Section, ACS, was held at Science Park, Charles River Dam, Boston, Mass., October 15, with Lester A. Brooks, Jr., R. T. Vanderbilt Co., speaking on "The Chemistry of Rubber Chemicals," before 100 members and guests.

The talk was preceded by a dinner in the speaker's honor, attended by 85, and by the annual business meeting and election of officers. The slate submitted by the nominating committee, Charles S. Frary, Jr., Boston Woven Hose & Rubber Co., chairman, was unanimously elected. Officers for the coming year are: chairman, Max Taitel, UBS Chemicals; chairman-elect and program committee chairman, J. Horace Faull, Jr., consultant; secretary, James H. Fitzgerald, Harwick Standard Chemical Co.; treasurer, Henry A. Hill, National Polychemicals, Inc.; hospitality committee chairman, Joseph C. Donahue, Goodyear Tire & Rubber Co.; and custodian, Henry S. Anthony, Tyer Rubber Co.

Dr. Brooks discussed the common and newer accelerators, antioxidants, and mildew-proofing agents, indicating their structure and methods of formation, and current uses in the rubber industry and in other industries. He also dealt with the properties of the metallic salts of many of these compounds, and the special uses of each.

Buffalo Hears RMA's Sears

The Buffalo Rubber Group at its meeting on October 8 at the Hotel Westbrook, Buffalo, N. Y., heard W. J. Sears, vice president of The Rubber Manufacturers Association, Inc., speak on the "International Responsibilities of the RMA Crude Rubber Committee." At this same meeting C. H. Peterson, president, U. S. Rubber Reclaiming Co., discussed labor relations in the rubber industry.

Mr. Sears first explained that the RMA Crude Rubber Committee was made up of rubber buyers from 14 rubber goods manufacturing companies, who account for the majority of crude natural rubber consumed in the United States. This committee is a standing committee under the by-laws of the RMA, charged with several responsibilities including the promulgation of natural rubber type descriptions and packing specifications, RMA rubber contracts, and represents the RMA in discussions with other domestic organizations such as the Rubber Trade Association of New York, the Shipping Conference, and the Commodity Exchange.

The RMA Crude Rubber Committee became involved internationally with the issuance of the first RMA type samples and descriptions in 1928. These were renewed in 1938, and packing specifications adopted. World War II interrupted this activity, but it was renewed again in 1946. In 1950 the International Rubber Study Group formed a packing and marketing committee, and the result was promotion of RMA type samples and descriptions. The Korean War interrupted these activities, but in 1952 a new RMA book of descriptions was introduced at the Study Group meeting, and in 1953 appreciation of the need of international standards developed.

Two International Conferences on Natural Rubber Quality and Packing were held, the first in Singapore in 1954, and the second in New York in 1955. The revised "Type Descriptions and Packing Specifications for Natural Rubber Grades Used in International Trade" was published and made effective in February, 1957.

In conclusion, Mr. Sears emphasized that the natural rubber consumer in this country should make certain that he is adequately compensated for any substandard rubber and that American rubber goods manufacturers with foreign affiliates should take steps to improve rubber inspection at foreign ports.

Ontario Group Hears Taylor

The first regular monthly meeting of the Ontario Rubber Group for its 1957-58 season featured an address by Don Taylor, vice president and research director, Organic Laboratories, Ltd., Brampton, Ont., on "Interesting German Plastic Practices and Material Developments." About 90 members and guests attended the social hour preceding the dinner and the dinner itself.

In his address Mr. Taylor stated that whether the Germans are leading the United States and Canada in plastic material, product and technology development is fundamentally a point of view. The developments and subsequent commercial history of such materials as polystyrene, polyvinyl polymers and copolymers, and recently, linear polyethylene and polypropylene indicate the direction in which the Germans can be safely said to have substantial and wide experience.

It was emphasized that during the prewar and war years, Germany's vast chemical research powerhouse kept the German domestic economy as well as the war machine in full mobile shape despite dire metal shortages and the like.

Synthetic rubber production and development were closely linked with German styrene production—having produced styrene and polystyrene for commercial industrial use in 1933. While we on this continent are engaged in a rigid vinyl craze at the moment, Germany is busily developing linear polyethylene materials such as Hoechst G.M. 5010 for use in piping, tank linings, etc., predicated on a 50-year lifespan expectancy for these materials under normal outdoor conditions.

Scrap problems in Germany are still attacked with considerable vigor. Huls, one of Germany's leading producers of basic vinyl resins, has researched so thoroughly into the problem of coated-fabric scrap that it has already developed a range of materials of low cost which enables the reprocessing of such scrap into such products as flooring. Following in this vein, Organic Laboratories successfully followed the Huls system to prove the utilitarian economics of this type of venture on the Canadian scene.

Group Holds Golf Successful Outing

A record number of 163 members and guests attended the tenth annual field day of the Ontario Rubber Group at the Dundas Golf & Country Club, Dundas, Ont., Canada, September 27. Following the golf tournament was a barbecued chicken dinner that evening.

Head-table guests included: the chairman, Wray A. Cline, Canadian General-Tower; vice chairman, Carl Croakman, Columbian Carbon (Canada); treasurer, D. Seymour, Cabot Carbon of Canada; chairman, Rubber Division, CIC, Ken Cunliffe, Dunlop Canada, Ltd.; Paul Sick, representing Rubber Division, ACS; W. K. Bechtel, past chairman of the Ontario Group; Bruce Williams, Feather Industries, Toronto representative; Ross Smith, Dominion Rubber, Kitchener representative; and W. P. B. Gedye, Monsanto Canada, Ltd., and RUBBER WORLD.

A rousing unanimous vote of thanks was expressed by all present to the golf committee headed by Lloyd Lomas, St. Lawrence Chemical.

C. Pavanel, B. F. Goodrich Chemical Co., won the Canada Carbon Black Co. Trophy for 1957-58, with the low gross score of 75. Donated by Ross Dennis, of Canada Carbon, the trophy was presented by last year's winner, G. H. Hebrecht, Kaufman Rubber, who won second low gross this year.

The first, second, and third low net winners were G. Young, C.I.L.; K. Glenfield, Dominion Rubber tire division; and J. P. Hooper, H. I. Blachford Co., Ltd., respectively.

High scorer (164) in the tournament was R. Milburn, W. C. Hardesty of Canada.

In addition to the golfing prize winners, everyone present took part in the drawing for door prizes, thanks to the generosity of more than 100 suppliers.

Marvel Heads ACS Building Fund Drive for $3 Million

Carl Shipp Marvel, research professor of organic chemistry at the University of Illinois and World War II leader in the development of synthetic rubber and anti-malarial drugs, has been named national chairman of the American Chemical Society's $3-million building fund campaign, according to John H. Nair, chairman of the planning committee and assistant director of research for Thomas J. Lipton, Inc.

The money will be used to construct a new eight-story headquarters on the site of the Society's present building at 1155 Sixteenth St., N.W., Washington, D. C.

Chairmen are now being selected for the 55 areas into which the country has been divided for the campaign, and "kick-off" meetings for these campaign-area chairmen will be held in the near future.

USDA-Clemson Research

A new research program to study the effects of various synthetic-resin and rubber latex emulsions upon cotton was recently announced by the United States Department of Agriculture. A contract for this research has been negotiated between the Department's Agricultural Research Service and the Clemson Agricultural College School of Textiles at Clemson, S. C., where the work will be done.

Many resinous and rubber-latex compounds are now commercially available. Although some of them are already being used to treat cotton, their full possibilities have not yet been explored. In the Clemson study, selected compounds will be used to learn if they will impart desirable new qualities to cotton.

Preliminary analysis shows that some of these compounds can improve cotton's resistance to water, abrasion, weathering, and soiling. Tenting, tarpaulins, and rainwear and other cotton clothing may benefit from such improvement.

James H. Langston, professor of textile chemistry and dyeing at Clemson, and Carl Hamalainen of the Cotton Chemical Section at the New Orleans laboratory of the Department of Agriculture will direct the research.

Reclaim Panel at Boston

The first meeting of the current season and the third of 1957 for the Boston Rubber Group was held at the Hotel Somerset, Boston, Mass., October 18, with an afternoon symposium on reclaimed rubber, followed by a preprandial hour and then dinner, attended by 250. Tom Dowd, traveling secretary of the Boston Red Sox, was the after-dinner speaker.

The symposium, presided over by Arthur I. Ross, American Biltrite Rubber Co., group chairman, and attended by 90, was conducted by T. H. Fitzgerald, Naugatuck Chemical, Division of United States Rubber Co., as moderator, and had the following panel of speakers: J. M. Ball, Midwest Rubber Reclaiming Co.; J. E. Brothers, Ohio Rubber Co.; W. R. Macy, B. F. Goodrich Co.; H. D. Glenn, Naugatuck Chemical; C. Huddleston, U. S. Rubber Reclaiming Co.; J. E. Meisner, Xylos Rubber Co.

Mr. Ball discussed what reclaimed rubber is; smooth SBR-reclaim stocks; types of butyl reclaims; and the future of reclaimed rubber.

Mr. Brothers spoke on reclaim in molded, extruded, and calendered goods, in soles and heels, in rubber-to-metal adhesion; on reclaim used to meet military specifications; the use of whole tire reclaim in nitrile and neoprene stocks and in automotive mats; reclaim in adhesives; and the bonding of PVC to rubber-base stocks.

Mr. Macy dealt with the manufacture of reclaim, the effect of reclaim on rates of cure, the oxygen-aging of reclaimed rubber stocks, and the outlook for butyl scrap.

Dr. Glenn considered the available types of reclaim, the use of reclaim with oil-extended SBR, non-staining reclaims, the future of butyl tires, and reclaim in asphaltic products.

Mr. Huddleston spoke on where reclaim is used, and why; camelback; cements and tapes using reclaim; reclaim in sponge rubber; synthetic rubber reclaims; reclaims in adhesives; and polyurethane reclaiming.

Mr. Meisner covered the use of reclaim in the tire industry, reclaim consumption today, light-colored reclaim, use of butyl scrap, reclaim as a process aid, and premixed or precompounded reclaims.

The symposium was in the form of prepared statements, prepared questions asked of the panelists, and questions from the floor.

At the dinner the nominating committee proposed John M. Hussey, Goodyear Tire & Rubber Co.; Norman Mullen, Charles K. Mullen, Inc.; and Fred Nadherny, Godfrey L. Cabot, Inc., for junior executive committee member, to be elected for two years. (Because of recent changes in the Group by-laws, this office is the only one open for election, all other offices being filled by automatic succession according to by-law direction.)

The next meeting will be the Christmas party, to be held December 13 at the Somerset Hotel.

AIHA Hygienic Guides

The National Safety Council, Rubber Section, in a recent newsletter has announced that the American Industrial Hygiene Association is publishing a continuing series of Hygienic Guides in the AIHA Quarterly. To date, the subjects covered on separate guides appear in the following listing:

Acetaldehyde	Fluoride-bearing dusts and fumes
Acetic acid	Fluorine
Acetone	Formaldehyde
Acrylonitrile	Hydrogen cyanide
Amyl acetate	Hydrogen fluoride
Anhydrous ammonia	Hydrogen sulfide
Aniline	Hydrazine
Arsine	Mercury
Benzol	Methyl ethyl ketone
Beryllium	Methylene dichloride
Butyl alcohol	Nickel carbonyl
Cadmium	Nitrogen dioxide
Carbon disulfide	Ozone
Carbon monoxide	Sulfur dioxide
Carbon tetrachloride	Trichloroethylene
Chromic acid	1,1,1,-Trichloroethane
1,2-Dichloroethane	Zinc oxide
Ethyl alcohol	

The guides are concise, consisting at most of a double page, and provide information on the recommended maximum atmospheric concentration, the type of hazard, procedure for evaluating atmospheric exposures, recommended control procedures, and specific medical procedures. Copies of any of the guides can be obtained from the American Industrial Hygiene Association, Detroit, Mich., at 25¢ each.

A discount of 20% is allowed on orders of five or more; 40% on orders of 100 or more. Remittance for orders of less than $2 must be made with the order. A loose-leaf binder for preserving the individual Guide sheets is also available at $1.25.

Phillips Shows Film

Rubber chemical division, Phillips Chemical Co., Trenton, N. J., showed a 40-minute moving picture, "Apples for the Teacher," on October 10 at the Trenton Country Club. This full colored film, which depicted the production of the company's synthetic rubbers and oil furnace carbon blacks, was preceded by a cocktail hour and dinner. A few of the noteworthy results of Phillips research efforts are important contributions to the development of cold rubbers; commercial production of tertiary mercaptans as polymerization modifiers; and origination of oil furnace carbon blacks which in turn, contributed greatly to the processability and success of synthetic rubber.

The company's polymers, marketed under the trade name Philprene, include hot and cold types, pigmented, non-pigmented, oil-extended, and many special types such as low water-absorption polymers for the wire and cable industry.

A technical brochure describing the company's carbon blacks and synthetic rubbers is available.

Letter to the Editor

DEAR SIR:

Your editorial in the July, 1957, RUBBER WORLD has just come to my attention. The need of distinguishing between a "rubber" and a "plastic" with a better definition is a good point. I cannot help you there, but would like to ask if the terms "plastic" and "resin" are meant to be used synonymously, or if we can likewise distinguish between the two.

You will know that materials such as "Durez" phenol - formaldehyde and "Cumar" coumarone-indene resins are commonly used to plasticize or extend rubbers. Are such mixtures as final products then rightly termed "rubber-plastic" blends? When is a resin a resin, and when is it a plastic?

The usual terminology seems to imply that "resin" refers to raw materials, while "plastics" refer to the finished product. If the term "rubber" is applied to both the raw material and the finished product, isn't it correct to apply "resin" in the same manner, so that "plastics" may be termed "resins"?

The difference between plastics and rubber apparently centers on the term elasticity, one being elastic, and the other non-elastic. Would it be correct to consider the difference between plastics and resins as being one of "pliability" since the term "plastic" implies that the material is pliable?

Perhaps you or your correspondents can straighten me out on the terminology of "resins" *vs.* "plastics," as well as devise a better definition for "plastic" *vs.* "rubber."

K. E. KRESS
Firestone Tire & Rubber Co.
Akron, O.

"Plastics" and "resins," if redefined, will help the "rubber" versus "plastic" problem. Can you help?—EDITOR.

Washington Report

BY ROBERT L. L. ADAMSON

ODM Civilian Commission to Review Stockpile Policy; New Concepts of Future War May Produce Some Changes

While the nation last month was getting itself used to the fact that "Sputnik" may have rendered the conventional warplane obsolete, the Federal Government was acknowledging that the atom and hydrogen bombs may have rendered conventional weapons obsolete. Thus Defense Mobilizer Gordon Gray announced a plan to give the huge stockpile of 75 strategic materials, including some 1.2 million tons of natural rubber, a thoroughgoing review.

Gray decided to ask a civilian commission of 8-12 highly regarded citizens—none with direct connections to the 75 items supplied to the stockpile—to reappraise the country's need of an inventory estimated to be worth $6.5 billion. This awesome "kitty" was built up on the basis of decisions made more than a decade ago when the United States leadership decided that this country would never again be found wanting in strategic materials in a military emergency.

Events Change Policy

In the early post-World War II days, both the political and military policy-makers were in agreement that the United States would do well to keep a five-year supply of basic raw materials in the pantry, and the stockpiling purchase program was established on this basis. The events of recent years, however, have brought the scrapping of this five-year timetable because of three possible concepts:

1. Continuation of the "cold war" with Russia. The fight for the minds of the uncommitted world, as this struggle has come to be known, may bring the loss of areas from which the U. S. receives strategic materials; for example, the absorption of a rubber-producing country into the Communist orbit could seriously affect U. S. trade with that country, having in mind the little trade now being conducted between the U. S. and Russia and her satellite countries. This concept is not now a part of stockpile planning.

2. Conventional warfare—anything from the so-called "Brush Fire" war to the long-term conflict of World War II. In stockpile and mobilization parlance, this is a C-type war (C for conventional) for which the stockpile idea was designed to prepare the U. S. A latter-day refinement in planning for this type of engagement, however, has been the reduction of the "pantry period" from five to three years.

3. Nuclear or thermonuclear attack on the U. S. This concept is expected to have the most influential affect on the study announced by Gray. For one thing, there is little disagreement that the existing stockpiles would be virtually inconsequential should the U. S. suffer an attack with these horrifyingly destructive weapons. The emphasis would shift from ability to wage war to ability to survive, then rehabilitation of the survivors. In this event the facilities to process raw materials would almost certainly be non-existent, and it would be far more plausible to stockpile finished products.

Disposal Problem Serious

As complicated as is the picture painted by these three possibilities, the new stockpile commission's chief problem may be in dealing with the "white elephant" born of the single concept of conventional warfare—the mighty inventory of strategic raw materials. To declare these goods no longer necessary is one thing; to re-insert them into the stream of commerce is another. Aides to ODM Chief Gray say the new commission will be spared the duty of recommending possible solutions to this dilemma, but it will be asked to lay the ground-work for decisions by describing the problems presented in the full or partial dissolution of the rubber inventory, for example.

The inherent difficulties of government sales in a free market have long been recognized by the Executive Branch and the Congress, with existing law providing a very tortuous road for the disposal of any of the 75 stockpiled commodities.

Domestic and foreign markets could be seriously depressed if large quantities from the government's hoard were suddenly or even gradually thrown on the market. This fact is particularly true of natural rubber which has the reputation of being the most volatile commodity in the world of trade. The possibility a year ago that the U. S. Government might modify its rotation system temporarily—with no overall reduction of the stockpile—to meet a shortage occasioned by the closing of Suez threw the Far Eastern suppliers of natural rubber and their buyers in this country into an uproar. Under the plan to revamp the stockpiling system all these pitfalls would be spread on the record by the civilian study group and its ODM staff. But the officials of the Administration and Congress would have to take it from there.

Report Difficulties

The appointment of a non-governmental re-appraisal committee—at least one member of which, by the way, will represent each of the fields of science, medicine, and the military—is a logical follow-up to the high-level metamorphosis from the single conventional warfare concept to the three concepts listed above. In other words, these new concepts are already a part of high-level policy—arrived at by agreement of the National Security Council, ODM, the Department of Defense, and the hot- and cold-war specialists at the Department of State.

The study group will not be asked to test these concepts for validity, but, rather, to decide whether the "old numbers" should be replaced with a new set. For some commodities, this policy may mean no change in the stockpiled quantity; for some, it may even mean a recommended increase; and for the rest, it will bring a suggested reduction or outright dissolution.

So far as rubber is concerned, there are pressures building up for reduction of the stockpile quite independent of the overall review now in the works. Simply, these are: (1) technical developments in the continuing effort to perfect synthetics capable of filling all the functions of natural rubber; and (2) the substitution of the three-year preparedness period for the five-year period which has dominated stockpiling policy since World War II.

Recent signs that the U. S. could supply its rubber needs with synthetics raise a serious question about the need of maintaining the 1.2-million ton inventory of natural. The government has rebuffed arguments based on this thinking in the last 2-3 years, chiefly on the ground that costs of the new synthetics would be prohibitive. The critics of a large rubber stockpile, however, have been given further ammunition by the Pentagon's disclosure that it has accepted a three-year period for defense planning and that a five-year supply of strategic materials is too much. These two pressure areas could bring a debate for reduction of rubber or other stockpiled items, regardless of the activities of the review commission.

The commission has been asked to deliver a preliminary report to Defense Mobilizer Gray before the end of January. The complex nature of its task, however, according to government officials, will probably require considerably more time, probably at least six months. The commission will get staff aid from a group of ODM officials headed by Arthur Wolff, an acknowledged expert on both rubber and the stockpile. In addition, Wolff will probably call in a few outside consultants to supplement the ODM people.

The 8-12 man study group will meet periodically to review the day-to-day progress of the staff, and all its findings will be submitted to Gordon Gray.

Debate in 1958 on Reciprocal Trade Agreements Act Renewal Will Involve Rubber and Chemical Industries

Rubber, plastics, and other chemical interests will be right in the thick of next year's fight over the United States foreign trade program, which the Eisenhower Administration touched off during October with a round of speeches and public papers. The year 1958 presents easily the biggest challenge to this country's 25-year-old program of liberal trade policy because it is the year of the "aroused protectionist" and of renewal of the Reciprocal Trade Agreements Act.

The RTAA Fight

The Act was last renewed in 1955, for a three-year period. It squeaked by the House in a very close vote, but was amended by the Senate to provide the groundwork for the recent federal program to limit imports of crude oil. The Senate's amendment was the spark of a protectionist conflagration which has only smouldered since 1955, but which everybody, including the Administration, expects to burst on the trade program within the next few months. The United States rubber footwear and chemical industries have served notice they will be among the protagonists for the erection of tariff barriers against low-cost foreign goods.

A simple explanation of the fight is this: First, certain domestic industries, suffering increasingly from the U. S. import of cheaper-to-produce goods, feel they must have protection from these goods, or shrivel up. Where will their services be, they ask, if a national security demands the products and skills only they can furnish? Second, the opposite element, principally those U. S. firms or industries with substantial foreign investments or exports, feels that their financial security and that of the country as a whole rests in promoting more and more trade with the rest of the free world.

The Department of Commerce lists chemicals and rubber products as among the principal non-agricultural industries "which are markedly above the nation's average" in their reliance upon export trade. Synthetic rubber, one of the country's newest and most promising export commodity, reached 150,000 long tons last year and may pass the 200,000-ton mark this year. Styrene-butadiene rubber (SBR), the bulk of the export business, was shipped to a total of only 11,000 tons in 1954; in 1956, the total was 112,336 tons.

With little increase in world production of natural rubber expected before 1965, the supply of American synthetic rubber is expected to be a major factor in meeting both U. S. and foreign demands as they grow in the interim. On the import side, natural rubber was among the major raw materials making a sizable gain between 1953 and 1956, as listed by the Commerce Department.

Trade Can Be Made

Both natural and synthetic rubber were given special attention in a paper prepared for a special 1,100-word study on U. S. trade published in October by the House Ways and Means Committee. Two economists with the Federal Reserve Bank of New York used natural rubber to make their point that the economic wealth of all countries is increased by exploiting "their particular endowments." Natural rubber, they pointed out, can be obtained from guayule bushes grown in the U. S., "but peacetime production could hardly be justified at the $100-per-pound cost of sizable wartime plantings, so long as tree-grown rubber is selling in the vicinity of 30¢ per pound." Only national security, they argued, should be permitted to interfere with this type of classical reason for promoting free trade.

On the export side of the ledger, they said that U. S.-produced synthetic rubber was an "outstanding" example of the buoyancy of U. S. exports provided by the development of new products "by a research-conscious industry." Exports rose from "practically zero" after World War II to $97 million in 1956, it was pointed out.

"Synthetic fibers," the economists went on, "have not only almost eliminated our once-thriving imports of silk, but have created an export market which last year absorbed $239 million worth of products. Sales of plastics and synthetic resins amounted to $119 million in 1955, compared with only $8 million in 1937. Most of these developments testify to the tremendous growth and inventiveness of the domestic chemical industry over the past two decades.

"Exports of chemicals and related products in 1956 were almost 10 times their value in 1936-38, a period in which chemical imports equaled two-thirds of our exports. Here is an area where research, heavy capital investment, and aggressive management seem to have made the U. S. a strong competitor in foreign markets formerly dominated by German and British companies.

"It is also of considerable interest that wages in the chemical industry are well above those of non-export industries. Average hourly earnings in facilities producing organic and inorganic chemicals and plastic materials ranged in 1947 from 13 to 28% above the average for manufacturing industries with small export sales."

Comparing the two types of rubber with each other, the economists said the perfection of synthetic was a striking example of the import-saving character of a major innovation, although imports of natural are still substantial, but meet only 33% of U. S. need now, as against 100% pre-World War II. The 1955 imports of natural totaled 714,000 tons, they said, as against 632,000 tons in 1929. It was stressed, moreover, that the $95 million in 1956 exports of synthetic was 25% of the value of natural rubber imports.

Higher Chemical Tariffs?

J. E. Hill, president of the Manufacturing Chemists' Association, replying to the free traders, accepted the fact that the chemical industry has been a strong competitor in foreign markets. He said, however, its record of fashioning "scientific miracles does not necessarily include the ability to circumvent economic obstacles." Specifically, he argued, the U. S. industry could not long compete "with foreign-made goods which are produced under conditions we would not tolerate," including cheap wages and less restrictive anti-trust laws.

"Cost of production of many chemical products in the United States," he argued, "substantially exceeds the cost of production in other countries, not by reason of any inadequacy on the part of domestic industry, but because of the cost of the higher social standards to which the domestic economy is committed. Unless means are provided to offset differences in domestic and foreign costs, domestic production of many chemicals may cease, and the U. S. would then become dependent upon foreign sources for them."

Hill's arguments were echoed by P. K. Lawrence, chairman of the international commercial relations committee, Synthetic Organic Chemical Manufacturers Association. Synthetic rubber and other materials produced by the synthetic organic chemicals industry, Lawrence emphasized, "are indispensable to the production of the amazing stream of new products, processes, and uses which have spurred the expansion rate of growth of the entire U. S. economy.

"Literally thousands of chemicals are annually produced by the industry," he added, "and this production is so interrelated that a decline in output of a particular chemical adversely affects the production of many other chemicals."

He called for "a most searching examination by the Congress" of the administration of the trade agreements program. He and other protectionist spokesmen have argued for years that the Trade Agreements Act puts too much constitutional power of Congress in the hands of the Executive Branch of the Government, and they want Congress to "reassume the duties and responsibilities vested in it" in all tariff and foreign trade matters.

"It is submitted," Lawrence insisted, "that national defense needs are inextricably linked with the status of tariffs, and the products of this industry must be safeguarded from threats of injury arising out of ill-considered and hasty duty concessions. The industry possesses ample capacity to serve peacetime requirements of the domestic economy; its ability to meet wartime emergencies depends upon the maintenance and continued growth of such capacity."

Tire Industry Wage Probe Report Due by Year's End

The Department of Labor got together in October with its labor-management panel on wages in the tire industry, and the management representatives came out of the meeting just as unhappy about the renewed wage investigation as they were about the original investigation. The panel meeting was the second this year—the first preliminary to a wage probe which was dropped in mid-summer; the second

preliminary to a revival of the probe under slightly different ground rules.

As reported in RUBBER WORLD last month, the original investigation was discontinued even before it got off the ground. Simultaneously with the decision to drop the original program, however, the Department of Labor decided to begin all over again with a new definition of what constitutes the tire industry. In the process, it was decided to exclude the makers of camelback and the tire retreading material, as well as the manufacturers of tire repair materials. When industry representatives sat down to their latest meeting with the government, however, they discovered that only the makers of tire repair materials were to be exempt from the inquiry.

Notwithstanding the objections of management, however, the Department of Labor has decided to proceed with the wage study under the Walsh-Healey Act. Under its terms, the government may require its suppliers of tires and other commodities to pay the "prevailing minimum wage" to workers laboring under government contracts of $10,000 or more. The revived wage study of the Labor Department is aimed at "finding" the prevailing minimum wage paid by the manufacturers of "pneumatic casings, inner tubes, industrial and highway solid tires with a two-inch cross-section or more, and camelback (tread rubber)." Any supplier under government contracts worth at least $10,000 would be required to increase his wages paid to workers under the contract to the "prevailing minimum" as defined by the Department, assuming his wages are not already at the minimum level.

Traditionally, there is a wide difference of opinion between management and labor over what the prevailing figure is at a given period. The government's Walsh-Healey experts will come up with a comprehensive study based on information supplied by the firms covered by the definition; the study will be submitted to both management and labor officials, and the whole issue will be thrashed out at a public hearing, probably late this year or early next. The record of this hearing will then be turned over to the Secretary of Labor for his decision.

Meanwhile The Rubber Manufacturers Association, Inc., has thrown its support behind a growing management push for investigation of the whole Walsh-Healey situation. RMA spokesmen contend that the Act is outmoded because it was designed to boost wage levels, along with other depression laws, during pre-World War II period of rock-bottom economic conditions. Labor interests, of course, favor any government action which results in higher pay in the tire industry, and they can be counted on to fight strenuously against any Congressional attempt to repeal or modify Walsh-Healey.

NTDRA Takes Strong Stand on Misleading Tire Ads

The National Tire Dealers & Retreaders Association served notice in October it has decided "to take into our own hands" the growing problem of misleading tire advertising. A spokesman for the NTDRA said its new, strong position on advertising grew out of the Association's mid-October convention in Cincinnati, where the delegates unanimously voted out a resolution addressed to "manufacturers, private-brand distributors and tire dealers" guilty of misleading advertising.

As a result of the resolution, NTDRA will initiate a drive for action by Congress or the jurisdictional federal agencies (chiefly the Federal Trade Commission), or both. FTC was on the verge of calling for voluntary action by the tire industry late this summer, but nothing has come from its investigation, as yet. Spokesmen for all parties immediately concerned—dealers, manufacturers, and the policing agency, FTC—have insisted that all agree that something must be done to "de-confuse" the consumers as to what they are buying. A first-line tire of one company may be of second- or third-line quality of another. The advertising picture is further confused by such phrases as "100" or "200" tires, and many others.

At Cincinnati, the dealers complained that "the designation and distribution of tire lines by manufacturers and private-brand distributors have been constantly subject to change and have created great confusion in the minds of the motoring public." The dealers charged, moreover, "some manufacturers, private-brand distributors, and some tire dealers have taken advantage of this situtation to advertise tires in a manner which is misleading and have thus damaged the prestige and reputation of the tire industry."

The resolution, described by NTDRA officials as the strongest ever adopted by the Association, called for the following program:

"All tire manufacturers and private-brand distributors immediately undertake a program designed to clarify their tire lines in order to eliminate confusion in the minds of the tire-buying public and also accomplish the following urgently needed objectives to restore integrity in the marketing of tires:

"1. Establish a clear and meaningful terminology in the designation of comparative tire qualities.

"2. Eliminate inflated so-called 'list-prices' and establish a reasonable relationship between the quality of the tire and the manufacturer's list price.

"3. Eliminate from tire lines all discontinued tires and all types of tires which are lowered in quality rather than carry the same descriptive term the following years after the relative quality of the tire has been changed.

"4. Destroy all unsafe tires which are returned for adjustment. Manufacturers are requested not to resell these unsafe tires or redistribute them in any market where they will be resold. Adjusted tires that are resold should be identified and advertised as used tires. . . .

"If these efforts are not effective, then the executive committee of the Association is directed to seek the aid of the Congress of the U. S. or the appropriate agencies of the Federal Government to take such action as will insure the protection of the tire buying public."

NTDRA officials said they would make an early appeal to both governmental areas in line with the resolution.

Ordnance Qualification Test Approval System Organized

The Ordnance Corps, Department of the Army, has announced the issuance of Military Specification, MIL-R-3065B(Ord.), "Rubber, Fabricated Parts." This specification requires qualification test approval for 21 rubber compound grades, which are defined in MIL-STD-417(Ord.), dated September 10, 1957.

MIL-R-3065B(Ord.) states that "rubber parts furnished under this specification shall be made from rubber compositions in accordance with one of the types, classes and grades designated in MIL-STD-417(Ord.)." It is stated further that "in procurement of rubber parts manufactured from compositions conforming to this specification and MIL-STD-417(Ord.), the right is reserved to reject bids on compositions listed in Table 1 that have not been subjected to the required tests contained in MIL-STD-417(Ord.) and found satisfactory for inclusion on the Qualified Products list . . ."

The 21 rubber grades listed in Table 1 mentioned above are as follows:

RS	SC	SB
$315ABC_1F_2$	$315A_1B_1F_2$	$415A_1B_1F_2$
$415ABC_1F_2$	$415A_1B_1F_2$	$515A_1B_1C_1F_2$
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$715ABC_1F_2$	$715A_1B_1F_2$	$715A_1B_1F_2$
$815ABC_1F_2$	$815A_1B_1F_2$	$815A_1B_1F_2$
$915ABC_1F_2$	$915A_1B_1F_2$	$915A_1B_1F_2$

The above suffix letter requirements are defined in MIL-STD-417(Ord.), dated September 10, 1957. The RS, SC, and SB types and the suffix-letter designations and tables are patterned after ASTM D 735-57T, Elastomeric Compounds for Automotive Specifications, of the American Society for Testing Materials.

The Ordnance Corps states that it is developing a list of suppliers for the 21 rubber grades requiring qualification, and that interested suppliers of such rubber compositions are requested to address their inquiries to the Laboratory, Rock Island Arsenal, Rock Island, Ill.

Notice Anything Different?

Perforated pages for easier removal for filing, a newly designed and more informative contents page, and a special "News of the RUBBER WORLD," summary page are additions and changes in this issue.

Have you tried tearing out any of these perforated pages? Please do so, and let us know how you like the idea.

Comments on the contents and news summary pages would also be appreciated. We would like to know if you are benefiting from these innovations.—EDITOR.

Industry News

New, Completely Integrated Synthetic Plant Opened By General Tire and El Paso Natural Gas Products

The nation's first privately financed and completely integrated synthetic rubber plant was officially placed in operation, October 18, at Odessa, Tex.

"This operation," said William O'Neil, president of The General Tire & Rubber Co., "climaxes years of study spent in developing a truly modern and efficient synthetic rubber plant design and in seeking out the best possible site on which to build it."

El Paso Natural Gas Products Co., headed by Paul Kayser, as majority owner in Odessa Butadiene Co., will operate the butadiene plant. General Tire, as sole owner, will operate the copolymer plant.

Other owners in the butadiene plant include W. D. Noel and E. G. Rodman, of Odessa, and United Carbon Co., Charleston, W. Va.

The butadiene plant, completed at a cost of $22 million, is capable of producing 50,000 short tons of butadiene a year. General Tire's copolymer plant is a $10-million installation capable of producing 40,000 long tons of synthetic rubber annually, with provision made for doubling the capacity of the plant.

The butadiene plant operates entirely from pipe-line gas (field butane), as contrasted with other plants which utilize butylenes from petroleum refining operations.

Already under construction nearby are a $5,500,000 styrene plant capable of producing 40 million pounds yearly, and an ultra-modern alkylation plant designed to produce daily 6,500 barrels of high octane gasoline and other products.

El Paso Gas is the majority owner of the styrene plant and sole owner of the new refinery. United Carbon is a minority stockholder in the styrene operation.

Of the 50,000 tons of butadiene being produced annually, 32,000 tons will be used by General Tire's copolymer plant, with the remainder going to United Rubber & Chemical Co., a subsidiary of United Carbon.

General Tire expects to retain about 70% of the copolymer production for its own use; the remainder will be placed on the market at the existing price of 24.1¢ a pound for the unpigmented polymer.

This is General's second venture in Texas. In 1944 the company built the first and only tire plant at Waco. The sixth addition to this plant recently was completed.

General Tire's Copolymer Plant

General Tire's stake in the growing West Texas petrochemical center is a new $10-million sleek and shiny SBR rubber plant.

Unlike plants built during the war emergency, General's new plant is designed for continuous polymerization. (See illustration on cover of this issue.) It is now possible to produce the same number of tons per man in a relatively small plant as can be obtained in a batch-process plant four to five times as large.

According to J. A. Pollock, plant manager, "This plant is instrumented to a point totally unknown in previous synthetic rubber plant design. It utilizes the astounding total of 880 different instruments, all relaying their messages to a supersensitive nerve center for absolute and continuous control by a single operator."

The new plant is designed to produce either hot or cold SBR, oil-extended SBR, and black and oil-black masterbatches. The down-time normally associated with a changeover from one product to another has been all but eliminated.

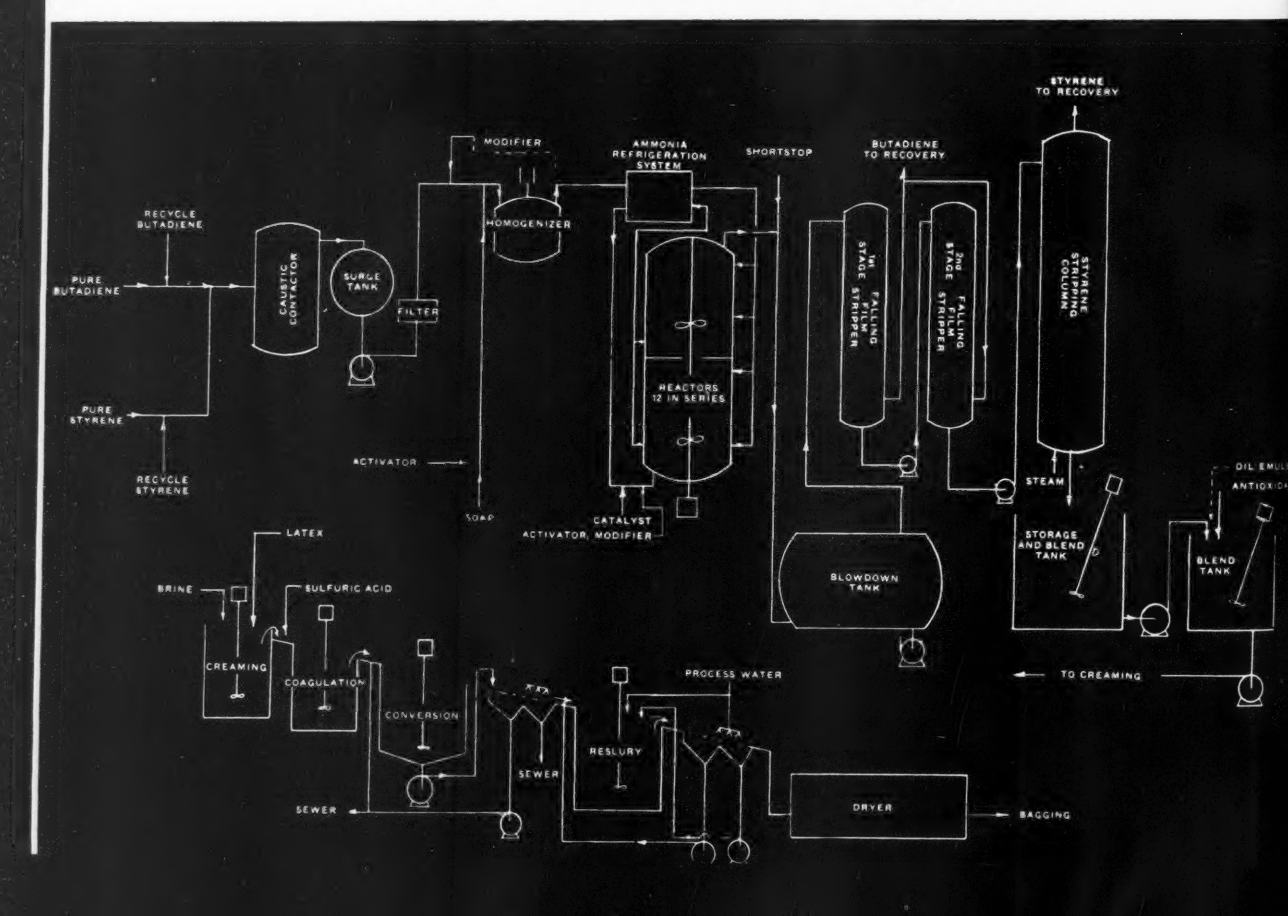
A flow diagram of General's copolymer plant is shown in Figure 1.

Odessa Butadiene

The Odessa butadiene plant is divided into three distinct process areas: (1) the dehydrogenation area; (2) the compression-absorption-fractionation area; and (3) the purification area.

The dehydrogenation process, licensed

Fig. 1. Flow diagram of General Tire's continuous process copolymer plant



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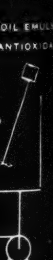
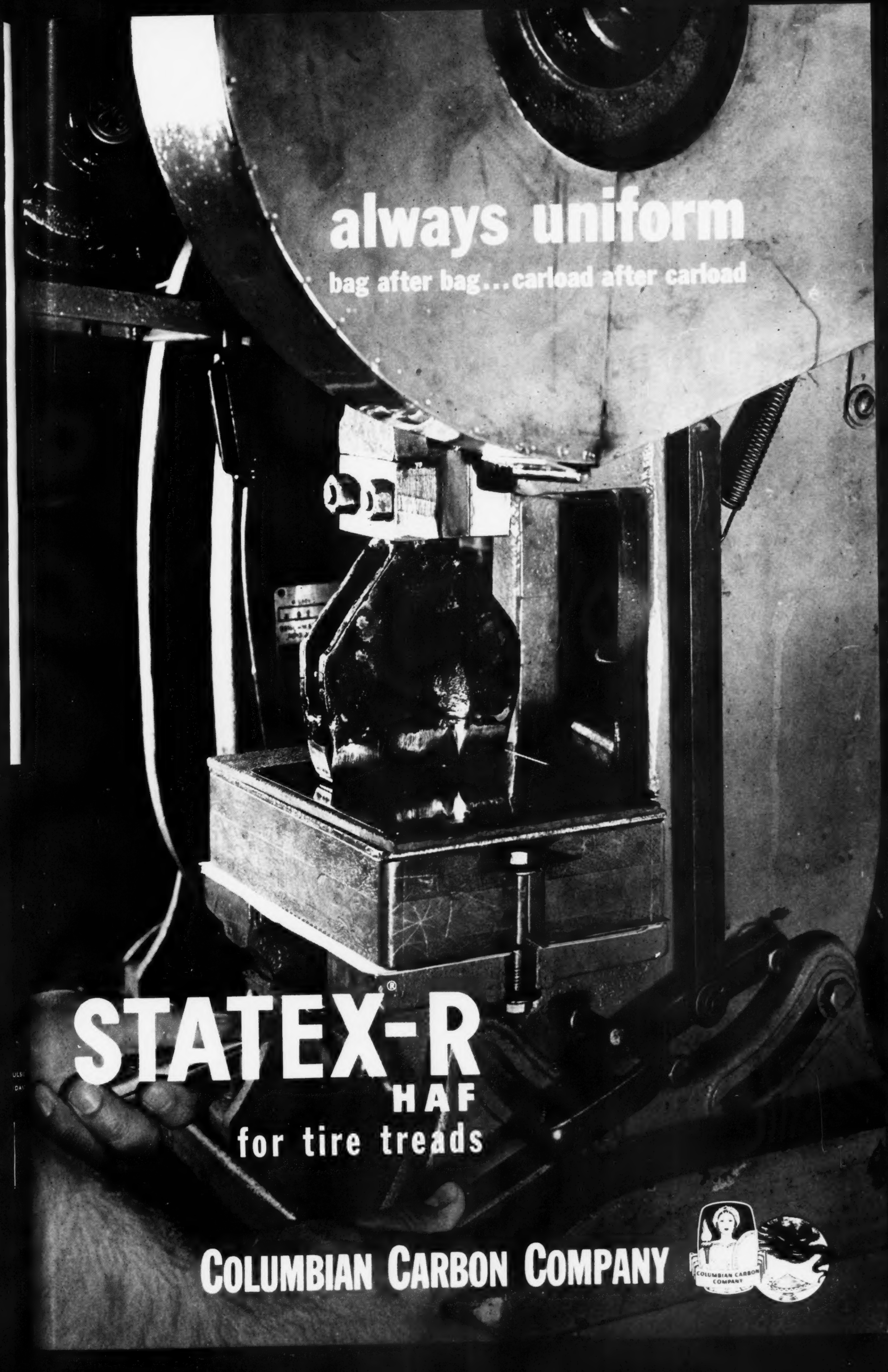



always uniform
bag after bag...carload after carload
STATEX-R®
HAF
for tire treads
COLUMBIAN CARBON COMPANY

by Houdry Corp., is a one-step catalytic dehydrogenation of normal butane and recycle butylenes to butadiene. (See Figure 2.) This step is accomplished by passing the hot gasified feed over a chrome alumina catalyst. The hot butadiene rich exit gases are then quenched to prevent polymerization and undesirable side reactions.

The butadiene rich gases, following quench oil cooling, are then compressed from 2.2 psia to 147 psia. These compressed gases then flow to an absorber where a portion of the propane and most of the butane and heavier gases are absorbed in oil. Some of the propane and most of the ethane and lighter gases flow from the absorber to a fuel mixing drum and are eventually used for boiler fuel. The butanes and heavier liquids flow to the deoiler where the C_4 fraction is vaporized out, condensed, and pumped to the purification area.

The purification process licensed by Jasco and Esso Research & Engineering, utilizes the affinity of cuprous ammonium acetate solution (CAA solution) for unsaturated hydrocarbons, to separate butadiene from the butane and butylenes in the C_4 mixture from the fractionation area.

A unique feature of this plant is that in order to conserve the underground water reserve, the effluent from the City of Odessa's sewage plant is reclaimed to provide process and cooling water. The water for the copolymer plant, however, is obtained from nearby wells.

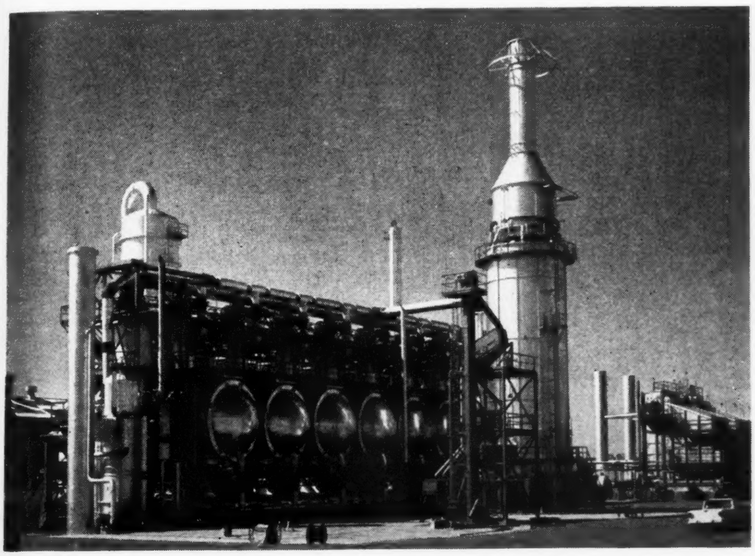


Fig. 2. Houdry catalytic unit at Odessa Butadiene Co. Horizontal units are conversion units; tall vessel on right is feed heater for these units

Litchfield Urges More Synthetic Rubber Production Abroad to Avoid U. S. Natural Shortage in 1960's

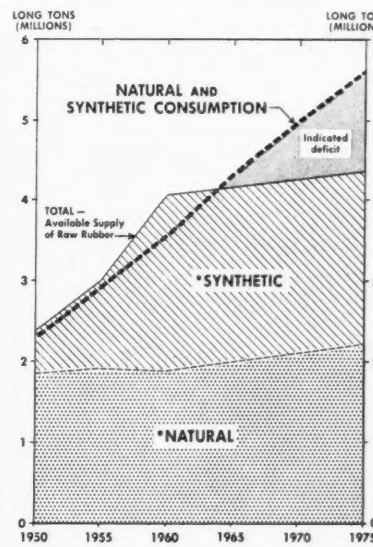
P. W. Litchfield, chairman of the board, Goodyear Tire & Rubber Co., is concerned about where the United States is going to get the increased amounts of natural rubber it will require in the early 1960's. He does not believe natural rubber production can be increased sufficiently by that time and wants the free nations of the western world to build more synthetic rubber production capacity and use more synthetic rubber so that some of the natural rubber they would otherwise use will be available to the United States.

Litchfield explained his position in another of his "Notes in America's Rubber Industry," this one entitled "Wanted: More Synthetic Capacity Overseas." The accompanying chart from the Litchfield study, gives actual and estimated natural and synthetic rubber production and consumption from 1950 through 1975 and indicates a considerable deficit of total new rubber which will begin in the early 1960's.

It is pointed out, first, that the United States produces 89% of the total world supply of synthetic rubber, and in 1957 our own total consumption was 63% synthetic and 37% natural, as compared with rest of the world consumption of 20% synthetic and 80% natural rubber. Unless the rest of the world increases its use of synthetic rubber, the growing market for truck, bus and other large tires in the United States will be seriously handicapped because these tires require a high content of natural rubber, and it is not likely to be available. The 80% natural, 20% synthetic consumption pattern of rubber consumption abroad should change to 32% synthetic in 1960 and 41% synthetic in 1965, with a corresponding decrease in natural rubber consumption, according to the Goodyear study.

The present consumption pattern in the United States of about 63% synthetic, 37% natural is approaching the limit as measured by product value and service, it was said. We cannot go much further with the presently available types of synthetic rubber. Synthetic polyisoprene is a replacement for natural rubber, but the *cost* of this rubber is, at this stage of the art, much too high to consider its use in normal, peacetime commerce.

Canada created synthetic rubber capacity long ago to take care if her needs. A new synthetic rubber plant is being built in England, and Japan and Italy have well-advanced plans for synthetic plants. West Germany capacity is being expanded, and there is some talk of synthetic rubber plants in South America. Mr. Litchfield says he is interested in accelerating this trend, for the critical period where demand will exceed supply is fixed between 1960 and 1965 and will become more acute with each succeeding year.



*Actual for 1950-1955. Currently estimated for 1960-1975.

Goodyear's estimate of natural and synthetic rubber consumption for the years 1950-1975

American synthetic rubber capacity might be expanded to take care of foreign demand and reduce the future squeeze on natural rubber supplies, but the Goodyear chairman thinks the synthetic rubber types required outside the United States may not be the same as those required to fit the climate and highways of America. Other lands will find it economical and practical to develop their own types to meet their own conditions and will at the same time be strengthening their own internal economies, he added. [According to a report from a German rubber journal detailed elsewhere in this issue, Russia and its allies have indicated that they are planning for a one-million ton a year synthetic rubber capacity by 1960.—Editor.]

Mr. Litchfield suggests that if the western nations need American aid to expand their synthetic rubber facilities, it should be granted. Whether this aid should take the form of private capital or grants or loans from our federal treasury is not so important as getting the job done, he added. Consideration of the basic idea by those responsible for our foreign policies is earnestly recommended.

Joe Covello from Black Star

American Cyanamid Co.'s Bound Brook research laboratories

American Cyanamid Dedicates New Research Center

A new $2-million research center at American Cyanamid Co.'s Bound Brook, N. J., laboratories was dedicated October 18 as part of the company's fiftieth anniversary program. The center consists of a building of three stories with 52,000 square feet of floor space. It has a steel frame, reinforced concrete floors, aluminum panel windows, masonry and red brick exterior. It is divided into two units: administration wing—library, conference rooms, executive offices; and a laboratory wing—containing about 40 separate laboratory units. It is completely air conditioned and designed for second laboratory wing addition.

Research activity, directed by Joseph H. Paden, director of the Bound Brook Laboratories, consists of product research in fields of dyes, textile chemicals and resins, rubber chemicals, intermediates, and organic pigments.

At the dedication of the research center, preceded by tours of the laboratories and the Bound Brook plant, V. E. Atkins, former general manager of the company's organic chemicals division, presented keys to Robert P. Parker, general manager, research division, and to Dr. Paden. Kenneth H. Klipstein, vice president-operations, who spoke at the dedication, summarized the 40 years of research at Bound Brook and emphasized the company's responsibility to use the research center for the advancement of scientific education and knowledge.

Following the dedication ceremony were a luncheon attended by some 400 scientists and a scientific meeting.

Professor Paul Gross, vice president of Duke University, as guest speaker at the luncheon, stated that "industry and the United States government should give more emphasis to basic research and insure lines of communication to breach the ramparts of our incomprehension of nature." The varied scientific activities of the International Geophysical Year and the launching of "Sputnik," he said, are indicative of the accelerated pace and global nature of today's research and development and call for world-wide dimensions in our thinking and communication of information.

Following Professor Gross's talk, Dr. Paden presided at the scientific meeting for the presentation of technical papers by a member of each of the three laboratories of the company's research division. The papers were: "Ultra-Violet Absorbers" by Richard J. Boyle, Bound Brook laboratories; "Aristocort Triamcinolone—A New Anti-Inflammatory Agent," by Seymour Bernstein, Pearl River research laboratories; and "Conversion of s-Triazine to Monosubstituted Derivatives," by Frederick C. Schaefer, Stamford research laboratories.

Dr. Boyle reported that compounds which absorb ultra-violet light have been found to be useful for protecting materials sensitive to this portion of sunlight. The most effective agents to date are the substituted 2-hydroxybenzophenones. These absorbers have a variety of interesting applications which can be divided into two classifications: (1) use in various materials as a stabilizer to prevent degradation by ultra-violet light, and (2) use in protective coatings as an optical filter for protecting light-sensitive objects.

Addition to Plastic & Rubber Product Co. plant

Stillman Rubber Expands

The extruded products division of Stillman Rubber Co. has moved into a new 10,000-square-foot building alongside present facilities to complete a two-phase expansion program that has increased production capacity by 100%.

The new building at 1233 E. Ash St., Fullerton, Calif., brings total covered factory area to 20,000-square-feet. Earlier in the year the company moved to a 7,000-square-foot building in the first phase of the expansion program. Currently the division's activities are consolidated at the three adjacent buildings.

Stillman's extruded products division specializes in production of extruded rubber products compounded from all rubber and rubber-like materials. The division has also entered the field of plastic extrusions.

Opens New LA Plant

Plastics & Rubber Products Co. has opened a new addition to its Los Angeles, Calif., plant that represents an increase of more than 50% to the existing space of 2100 Hyde Park Blvd. The entire second floor and a portion of the first floor will be devoted to offices, increasing the office space by more than 100%.

The new building will house the sales department, order department, personnel, credit union, factory offices, laboratory, engineering offices, a complete silicone and special materials production department, and a modern die shop.

Expansion of the die shop facilities will enable more rapid tooling. Silicone and special materials department is completely pressurized, resulting in ideal conditions for processing critical polymers. A large cold chamber for the storage of raw materials has also been added.

Moving of the silicone department will result in 100% increase in space for the Dauby process, a radically new method for mass production of O-rings and small precision molded rubber products.

Wyatt's Plastics Expands

Wyatt's Plastics, Inc., has expanded its manufacturing facilities with its second plant at Wallis, Tex., 37 miles west of Houston, where it has been in operation two years. The company, a wholly owned subsidiary of Wyatt Metal & Boiler Works, has offices and original plant in Houston, adjacent to the site of its parent company.

One activity due for transfer to Wallis from Houston is the production of cleats for football shoes. This was the leading product of Wright Mfg. Co., Houston, whose plastic molding division was purchased in 1955 as the nucleus of Wyatt's Plastics, Inc.

Carl J. Eckenrod, vice president and plant manager, held a similar position with Wright Mfg. Co. Wyatt's sales activity is under the direction of R. L. Jarmon, Jr.

Although operations at Wallis will not be restricted to rubber, the major share of activity will consist of custom molding rubber products and the production of rubber sheet stock. Facilities at Wallis also will permit enlarging output through a new line of combination rubber and plastic parts. These combinations are now in production for services in oil-well drilling activity.

Major units which went into operation at Wallis on October 1 include a large rubber mixing mill, a calender for producing rubber sheeting, and a tuber for extruding rubber stock. The plant has the usual complement of smaller machines, as well as a 1,200-ton press with large platen area. Additional equipment will be added as required.

Develop Airship Fabric

The low strength per weight ratio of fabric coverings for lighter-than-air-ships, made from natural fiber has prompted a program to find better coated fabrics, according to the Bureau of Aeronautics, Department of the Navy. In a recent test naval officers evaluated the performance of an anti-submarine patrol blimp with a skin of coated "Dacron" polyester fiber. During four months of trial flights, it was found that the fabric of "Dacron" reduced helium loss to one-half that in regular patrol-duty envelopes now used.

"Dacron," a product of E. I. du Pont de Nemours & Co., Inc., Wilmington, Del., was selected for the test operation because of its low stretch, high tear strength, higher strength to weight ratio, and resistance to weathering, rot, and mildew. The final envelope material comprised two layers of fabric of "Dacron" combined with an inside coating of neoprene, a binding layer of neoprene, and an outside coating of aluminized "Hypalon" synthetic rubber. Total weight of the laminated cloth was approximately 15½ ounces per square yard.

The airship covering of "Dacron" not only reduces helium loss, but its lighter weight permits carrying of additional equipment or more fuel for prolonged flights. Navy spokesmen, it is said, are enthusiastic about the trial performance and expect testing to continue, with additional airship envelopes of "Dacron" now on order.

Harwick Celebrates Its Silver Jubilee

September marked the twenty-fifth anniversary of Harwick Standard Chemical Co., Akron, O. The birthday was celebrated with an open house attended by hundreds from all parts of the country. The date, September 28, was an eventful day that not only honored the small beginning of the business by Curtis J. Harwick in 1932, but also paid tribute to the men and women of the organization who carried on, expanding the business after Mr. Harwick's death in 1948.

In a quarter-century Harwick's business of supplying compounding and processing chemicals to rubber and plastics manufacturers has grown from a one-room office to a nationwide service with branch and warehouse offices serving manufacturers from coast to coast. A plant to house general offices, manufacturing and warehouse was built on Seiberling St., Akron, in 1948. This year the capacity of that plant was doubled with the building of a new addition, which was completed and officially opened to the inspection of the anniversary party guests.

Heading the company's activities, through the Akron general office, is J. R. Moore. He was elected president in 1948, and Ray L. Lasser, purchasing and production man, was elected vice president. In 1956, D. F. Behney was elected vice president in charge of sales. F. A. Sancic is secretary and assistant treasurer. Mrs. Curtis J. Harwick serves as treasurer and chairman of the board of directors of Harwick Standard Chemical Co.

The Akron office is the nerve center of the organization. From its activities, sales and technical service of its chemists and representatives are directed through four subsidiary companies and offices in Boston, Trenton, Albertville, Ala., Chicago, Denver, and Los Angeles. The Massachusetts, New Jersey, Illinois, and California subsidiaries are headed by C. A. Meyer, R. J. Salyerds, A. L. Robinson, and D C. Maddy, respectively.

At Harwick Standard's open-house celebration *left to right* H. W. Catt, B. F. Goodrich Co.; J. R. Moore; Mrs. C. J. Harwick; R. W. Ostermayer, Pennsylvania Industrial Chemical Corp.

Plastics Institute Planned by SPE

The Society of Plastics Engineers, Inc., Greenwich, Conn., through its president, Peter W. Simmons, has appointed Jerome Formo chairman of a special committee to develop plans for the formation of a Plastics Institute. This Institute would serve the plastics industry in much the same way as the other basic product institutes serve their respective industries.

The Plastics Institute will provide facilities for research both fundamental and development, education for those in any branch of the industry, and an unparalleled library for reference and study. All segments of the plastics industry—fabricators, material suppliers, and equipment builders—will benefit from the Institute and, of course, will be invited to participate in its program and facilities to serve the industry.

For further information, write Jerome Formo, Chairman of the Plastics Institute Committee, 2753 Fourth Ave. S., Minneapolis, Minn.

New Machinery Department

The C. P. Hall Co., Akron, O., has formed a machinery department to handle the sales throughout Ohio of Erie Engine & Mfg. Co.'s mills, presses, loaders, lift tables, preform machines, and roving cutters. Erie Engine designs and manufactures a complete range of sizes of standard and custom equipment for the rubber, plastic, fiberglass and wood products industries.

The C. P. Hall Co. of California has represented Erie Engine on the West Coast for the past three years.

New Prexy, Veeps at U. S. Rubber

John W. McGovern has been elected president of United States Rubber Co., New York, N. Y., and designated chief operating officer. Formerly executive vice president, he succeeds H. E. Humphreys, Jr., as president. Humphreys continues as chairman of the board of directors and chief executive officer.

Mr. McGovern joined the company in 1920 as an accountant. After serving in numerous accounting, industrial, engineering, and production posts, he became general manager of the tire division in 1943. He was elected a vice president in 1945, a director and member of the executive committee in 1951, and executive vice president in 1956.

Also the board designated vice presidents Eugene A. Luxenberger and George R. Vila as group vice presidents. Luxenberger, formerly vice president and general manager of the footwear and general products division, will be responsible for the operation of the company's tire division, footwear and general products division, and mechanical goods division.

Mr. Vila, formerly vice president and general manager of the chemical division, will be responsible for the operation of Dominion Rubber Co., Ltd., Latex Fiber Industries, Inc., and the chemical, textile, international, and plantation divisions.

Also elected was Earle S. Ebers to a vice presidency and to general managership of the chemical division, succeeding Vila. C. William Pennington was elected a vice president and appointed general manager of the company's footwear and general products division, succeeding Eugene A. Luxenberger.

Anthony Mack

John W. McGovern

Pach Bros.

Eugene A. Luxenberger

Pach Bros.

George R. Vila

Oil-Heat Resistant Label

An oil- and heat-resistant label that adheres firmly to silicone rubber is solving a product identification problem for fabricators and their customers. Developed by the Avery Adhesive Label Corp., Monrovia, Calif., the pressure-sensitive labels are applied before the rubber is molded to provide permanent-gripping identification. One firm, for example, bonds the self-adhesive labels to the silicone rubber at temperatures in excess of 300° F. under 2,500 pounds' pressure on a 10-inch ram.

Available in a variety of shapes and sizes, the oil- and heat-resistant labels are expected to improve color coding and swift identification for a wide range of items now manufactured from silicone rubber. Designed to resist weather and temperature extremes, these include products such as automobile transmission seals, aircraft seals and ducts, roll coverings used in food processing, electrical cables, and tires now being developed for high-speed aircraft.

Applied with manual or automatic dispensers, the Avery labels are said to bond smoothly, creating the appearance of being part of the rubber. Although they will crack if the silicone rubber is elasticized sharply, the new labels grip firmly under the roughest handling methods, providing accurate identification at a glance and eliminating costly errors and delays.

Approve Rubber Compound

The Underwriters Laboratory, Chicago, Ill., has given its approval to a rubber compound developed by Minnesota Rubber & Gasket Co., Minneapolis, Minn., for sealing applications in the handling of gas and other petroleum derivatives.

Known as Compound 503A, the compound has been approved for use with gas, kerosene, naphtha, and LP gas, in both gaseous and liquid states, at temperatures from 30 to 125° F. The UL approval cites the compound's use as synthetic rubber seal rings intended for use in gaskets between bolted joints, stems, and shafts and as seals where rings of this sort are commonly used.

The newly approved compound was developed after extensive experimentation and testing in the company's research laboratories. It is expected to provide a superior material for sealing devices used in fuel pumping, gas and oil transmission lines, and other petroleum handling activities.

New Beebe Anchor Sole

A sole said to introduce an entirely new concept in shoemaking has been put on the market by Beebe Rubber Co., Nashua, N. H. Called the Beebe Anchor Sole, this lightweight, very flexible rubber sole is pre-molded and features a unique lip that anchors directly to the upper, thereby eliminating many operations in lasting and finishing. American patents are pending.

Using present machinery, shoe manufacturers can introduce the new method into their factories almost at once. Although, during the experimental stages, the Beebe Anchor Sole was cemented to slip-lasted uppers, a survey made among shoe manufacturers reveals that the new process is equally adaptable to regular cement, stitch-down, and Goodyear welt construction.

A varying number of manufacturing processes and machines are eliminated, depending upon the type. When soling a California-type upper, for example, the Beebe Anchor Sole method reduces all shoe manufacturing processes to just six: making upper, roughing, cementing upper and sole, slipping on Beebe Anchor Sole, pressing, and welt beating. In this way the same volume of shoes can be turned out with less space and less equipment.

The new soling process permits the shoe industry to compete favorably with vulcanizing without the heavy investment necessary to purchase and install vulcanizing equipment. This method of sole attaching may well be the shoe industry's answer to the growing demand for vulcanized footwear.

The new soling process was developed in Australia, and Beebe Rubber Co. has added refinements so that the sole is more adaptable to United States manufacturing methods. Specialist in rubber products and vulcanizing compounds for the shoe trade as well as exclusive manufacturer of the Ripple Sole in the U.S.A., Beebe Rubber Co. has exclusive rights also to manufacture the new sole in this country.

Monsanto Moves Offices

Monsanto Chemical Co. has opened general offices at a new location, culminating a program for administrative office consolidation which started more than seven years ago. Approximately 1,500 persons have moved to the group of new buildings just completed on a campus-like setting at Lindbergh and Olive St. Rd., St. Louis, Mo.

The new facilities being occupied consist of three identical office buildings, an executive building, and a utility building on a rolling 252-acre tract. The three principal buildings each contain three floors and together will provide more than 300,000 square feet of office space.

These new structures permit the consolidation at one site, for the first time since 1951, of all the Monsanto executive administration, staff departments, and St. Louis based divisions. Included in the move are the executive offices, the inorganic chemicals division, organic chemicals division, overseas division, research and engineering division, and the domestic subsidiaries and affiliates division; and the eight staff departments of the company. St. Louis district sales offices for all the company's divisions also are at the new location.

Instron Builds New Plant

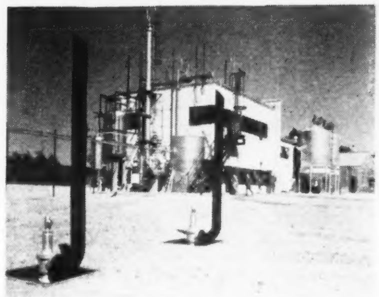
In order to meet stepped-up demands for its electronic testing equipment, Instron Engineering Corp., Quincy, Mass., is building a new, 25,000-square foot plant in Canton, Mass. Located at the intersection of Routes 128 and 138, Instron's new plant will be devoted to the design and production of universal testing machines and other electronic test equipment. The building will house the company's administrative and engineering offices. At present, Instron employs more than 70 people.

Senator Leverett Saltonstall officiated at cornerstone laying ceremonies. Other guests included consuls general representing Britain, Italy, Germany, France, and Canada. Also present were state and town officials.

Instron Engineering Corp. is headed by Harold Hindman, president, and George S. Burr, vice president and treasurer.

Hooker Research Center

Hooker Electrochemical Co., Niagara Falls, N. Y., has begun construction of a research center on Grand Island, N. Y. The initial facilities will be completed by late 1958 or early 1959. Costing approximately $3,500,000, the new research center will provide space for about 200 personnel. The Durez Plastics Division's basic plastics research laboratory staff will remain at its modern building in LeRoy, N. Y. In North Tonawanda, N. Y., the Durez Division plastics development and sales service laboratory personnel will continue to utilize the $1-million laboratory building completed last spring adjacent to the main Durez plant.



Cary's New PVC Plant

Cary's New PVC Plant

Cary Chemicals, Inc., manufacturer of chemical compounds for the vinyl and rubber industries, had the formal opening of its new polyvinyl chloride resin plant at Flemington, N. J., on September 25. The PVC resin produced at this plant will be used in the manufacture of vinyl compounds at the company's East Brunswick, N. J., plant and also will be marketed directly to various industrial consumers of vinyl resin.

Cary's manufacturing plant and central office are located on Ryders Lane, East Brunswick Township, N. J. The company's major product there is vinyl compound.

The company's new Flemington plant, will have a capacity of approximately 12 million pounds annually of polyvinyl chloride resin.

The welcoming address, preceded by a buffet and refreshments, was given by George F. Blasius, chairman of the board and treasurer of Cary Chemicals. The following speakers were Kenneth B. Cary, president of Cary; Harry Rehnberg, president of Scientific Design Co., Inc.; Kenneth Creberling, assistant to the Commissioner, Economic Development, State of New Jersey; Linton Alles, mayor of Flemington; Clarence Alles, township clerk; and Thomas Zawadzki.

On this same day Thomas Zawadzki was elected vice president in charge of sales and a member of the board of directors of the company. Prior to joining Cary Chemicals in 1956, he was with Firestone Plastics Co.

Thomas Zawadzki

Test Asphalt-Neoprene Road

Highway engineers in five states are cooperating with rubber chemists from E. I. du Pont de Nemours & Co., Inc., in testing asphalt-containing neoprene synthetic rubber as an improved material for surface-treated roads. If these field tests substantiate seven years of laboratory investigations, neoprene may lengthen substantially the life of the road surface and at the same time provide safer driving conditions and cut maintenance costs.

The synthetic rubber is mixed in specific proportions with standard asphalt, and the surface material is applied with conventional equipment. The test material is laid side by side with untreated asphalt so that both surfaces will be exposed to identical wear. In this way, regular inspections of the strips will give accurate comparisons.

It is expected that neoprene will add elasticity to the asphalt, holding the stone chips in place longer. In addition to longer life, this condition will provide better traction, contributing an important safety factor.

Since most secondary roads are of the surface-treated type, Du Pont requested typical rural roads for test sites. Roads are selected with curves, numerous rises, dips, and grades so that traffic can test the material under various conditions.

Thermatomic Expansion

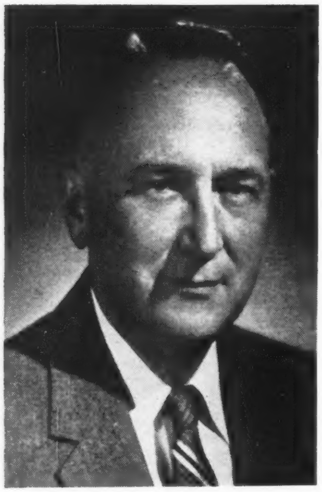
A new expansion, which will more than double the production of Floform (pelleted) Thermax, MT carbon black, in early 1958, has been announced by Thermatomic Carbon Co., a division of Commercial Solvents Corp., and R. T. Vanderbilt Co., Inc.

Floform Thermax, packed in 50-pound bags, will ship and store in 25% less space than powder, resulting in considerable savings in transportation, handling, and warehouse cost for domestic or foreign customers. This carbon black may be shipped in bulk.

It was reported that the special process for making the dustless, free-flowing Floform Thermax was developed in Thermatomic's recently expanded research and quality control laboratories. While the major output of the Sterlington, La., plant will be converted to this type, Thermax and P-33 FT carbon black, will continue to be available in powder for customers who require it.

Borden Adds to Facilities

The Borden Co., chemical division, has completed a modern, one-story office and laboratory building for its polyvinyl chloride department in Leominster, Mass. The new facility will be operated in conjunction with the PVC resin plant opened by the company at the same location last year. The laboratory is divided into three sections—for fundamental polymer research and development, semi-pilot operations, and technical service work on finished product processing and evaluation.



M. J. DeFrance

Goodyear Sets Up New Products Department

Establishment of a new products department with the functions of stimulating new product ideas and speeding up and supporting decisions for the initiation and progress of new product projects has been announced by Goodyear Tire & Rubber Co., Akron, O. The new unit will augment and facilitate the work of the company's research, development, production, and sales departments in their responsibilities for new products, ideas, and investigations. It will be the responsibility of the new products department to see that effort is directed and scheduled to produce a balanced—financial, marketing, technical—appraisal of new product projects from their inception to completion.

The department will have organizational responsibility to S. DuPree, vice president of general products group, and will have reporting responsibility to the company's policy committee.

Heading up the department will be a director, and reporting to him will be three administrators of the basic functions—finance, marketing, and technical. Technical representatives, to be added as required, will report to the technical administrator.

Named director of new products was M. J. DeFrance, who formerly was manager of chemical materials and products development.

Appointed as administrators were H. J. Bliss, former works accountant, Los Angeles—finance; C. B. Marks, former manager of manufacturers sales, shoe products division—marketing; and C. T. Wittl, former special products development engineer—technical.

Effective coordination of widely varied departmental efforts in connection with all phases of new product projects is necessary, it was said, to keep pace with the ever-increasing tempo of the modern-day economy and the demands placed on industry for new and improved goods and services. Such an operation will give added impetus to Goodyear's ever-expanding activities on all fronts of its widely diversified product fields.

Morningstar Acquires Federal Adhesives

The officers of Morningstar, Nicol, Inc., and Federal Adhesives Corp., both of New York, N. Y., have jointly announced the affiliation of their companies. Morningstar operates a subsidiary, Paisley Products, Inc., a large manufacturer of industrial and packaging adhesives, polyvinyl acetate resin emulsions, and many chemical specialties. This new Federal acquisition is in a similar line of business, manufacturing specialty adhesives, including a manufacturing affiliate in Baltimore, Adex Mfg. Co. The affiliation includes Federal Latex Corp., which manufactures rubber latex compounds, and Federal Chemicals Corp., manufacturer of industrial chemicals and vinyl plastisols.

The research, technical, and production facilities of the combined Paisley and Federal organizations will now be available to improve further, servicing of their customers on a nationwide basis. Paisley operates manufacturing plants in New York, Chicago, St. Louis, Los Angeles, and Redwood City, Calif., with sales offices in principal cities of the U. S. and Canada.

The sales and technical service staffs of both companies will continue unchanged, each specializing in its particular field. The key personnel of all the Federal organizations including management, sales, technical, and production have become members of the Morningstar organization.

Plans New Oliver Plant

Construction recently was started on a major addition to the East Coast manufacturing facilities of Oliver Tire & Rubber Co., Emeryville, Calif. The building is being erected at Flemington, N. J., by Dural Rubber Co., subsidiary of Oliver Tire.

The new plant facilities will cost $600,000 and provide an additional 50,000 square feet of space, which will include the latest in precision, production equipment. It is being built on property in Raritan Township, on land which adjoins the present Dural buildings, representing a total plant site of seven acres. The new project will accommodate an increasing demand in eastern markets for Oliver tire tread rubber and tire repair products.

Plans call for the plant addition to be in full operation by April, 1958. Company officials report that the new facilities will handle more than 25% of the firm's annual $10-million volume.

Both Oliver and Dural manufacture for national distribution a wide range of products in addition to tire material. These include automotive rubber parts for major automobile manufacturers as well as rubber products for industrial marine and household use. Dural will continue with manufacturing of such products in the existing Flemington plant.

Oliver Tire & Rubber Co. was founded in 1912. It is headquartered in the Oakland, Calif., area, where it operates two major plants.

C. L. Shreiner

Shreiner Heads Chardon Rubber Co.

Chardon Rubber Co., Chardon, O., has announced that V. M. Brediger, president and general manager for 22 years and one of its founders, has stepped down from that executive position with the Ball Brothers Co. subsidiary and become vice chairman of the Chardon board of directors. Named to succeed Brediger as president and general manager was C. L. Shreiner, another founder and executive of the Chardon firm. H. L. Oplinger, continuing as vice president in charge of manufacturing, became the firm's senior vice president.

The action came at Mr. Brediger's request at a recent meeting of Chardon directors. Announcement of the executive changes was made by Edmund F. Ball, chairman of the Chardon board and president of the Muncie, Ind., manufacturing firm, Ball Brothers Co., which acquired controlling interest in the mechanical rubber goods company three years ago.

Mr. Brediger, who resigned from his executive responsibilities because of his health, had served since 1935 as head of the company which only a few months ago completed a plant expansion that nearly doubled production capacities. He will remain in a close advisory capacity with the company by accepting the newly created position of vice chairman.

Mr. Shreiner had been executive vice president since the firm began operations in 1930.

Sargent Buys Mills

C. G. Sargent's Sons Corp., Graniteville, Mass., designer and manufacturer of dryers, coolers, and special feeds for the rubber industry, has purchased the property formerly known as the Abbot Worsted Mills in Graniteville. The purchase includes the mill buildings of 56,000 square feet and a separate, adjacent office building. Sargent will occupy a substantial part of the buildings immediately, for needed expansion of its fabrication department.

Today's Tires Withstand Severe Tests

The rayon cord now used in reinforcing the majority of the nation's automobile tires can easily withstand 60-mile-per-hour impacts against a half-foot-high granite curbing, according to test results announced by Motor Vehicle Research, South Lee, N. H. The tire tests were described as probably the most severe ever conducted under actual road conditions. Adding to the severity of the experimentation was prolonged driving that raised tire temperatures to the 200° F. range before impact.

The experiments were conducted for a group of rayon producers to clear up conflicting opinion about the ability of different types of tire cord to withstand severe impact under driving conditions.

It was reported that there was not a single trace of rayon cord damage, even though tire rims were badly bent, and the front end of test cars often suffered extensive damage as a result of the impacts.

Rayon was pitted against the other type of cord in use, nylon, throughout the tests. Results revealed no difference in the ability of the two cords to undergo this type of punishment. It was concluded from the tests that it would be inaccurate and misleading to claim that either rayon or nylon cord possessed better resistance to impact fracture.

The 25 tires used in the research—four-ply, size 7.50 x 14—were built by two leading manufacturers. In each case the tires to be compared in impact strength differed only in reinforcing cord and cord adhesive.

The tires, heated to scorching temperatures through road runs and tight-circle turns, were slammed into the curb stone at 20, 40, and 60 miles per hour. At 40 and 60 mph., the sharp edge of the granite slab bent the tire rims, but left the tires unmarked and, as borne out by subsequent laboratory tests, undamaged internally.

These tests indicated no superiority of nylon cord to resist damage compared to the same tires using rayon cord when impacting a curbing at speeds from 20 to 60 mph.

SF-96(40)—New Additive

General Electric Co., silicone products department, Waterford, N. Y., is manufacturing a methyl silicone fluid, SF-96(40), which is used as an additive in the production of flexible polyurethane foam. Commonly used to halt or minimize foaming, silicones are used in this application to stabilize foaming and produce uniform cell structure and density. Silicones may also be used to control cell sizes of polyurethane foams. Present indications are that uniform polyether foams, fastest growing members of the polyurethane family, cannot be produced in volume without the use of silicones. The amount of silicone fluids required usually ranges from between ½ and 1%, but may be as low as ¼% of the weight of the foam.

Spadone Institutes Repair and Maintenance Program

Spadone Machine Co., Inc., South Norwalk, Conn., manufacturer of certain types of machinery for the rubber and plastics industries, has instituted a repair and maintenance program or materials-handling equipment in the form of trucks and trays.

The company says that in addition to furnishing spring-leaf trucks and trays to industry, it has been called upon to furnish replacement trays and parts for trucks not of its own manufacture and to rebuild, modify, or redesign entire units. Enlarged and complete facilities have recently been added, and any problem, whether it be a small replacment part or a complete planned maintenance program for the above-mentioned items, will be studied, and recommendations made.

Committee D-11 Assigns Two SBR Numbers

Committee D-11 on Rubber and Rubber-Like Materials of the American Society for Testing Materials through Subcommittee 13 on Synthetic Elastomers of D-11 has assigned numbers to two styrene-butadiene rubbers (SBR) which have been in use for some time, SBR 1061 and SBR 1551. This procedure is in accordance with that established by Subcommittee 13 of D-11 and agreed to by the Committee, the Society, and the private producers of SBR and SBR latices.[1] These new rubbers will also be included in the letter-ballot which is now being processed in order to bring D 1419-56T up to date.

TABLE 1. DESCRIPTION OF TYPES OF STYRENE-BUTADIENE (SBR) RUBBERS—ASSIGNMENT OF NEW CODE NUMBERS—ASTM D 1419-56T

Number assigned	1061	1551
Date assigned	9/5/57	9/5/57
Requested by	Texas-U.S. Chemical	Texas-U.S. Chemical
Distinctive feature	NST SBR 1000 Type	NST SBR 1500 Type
Close previous number, if any	1061	1551
Type	NST hot unpigmented	NST cold unpigmented
Nominal temp., °F.	122	43
Activator	—	FRA
Shortstop	ND	ND
Antioxidant	NST	NST
Catalyst	P	OHP
Emulsifier	FA	RA
Nominal bound styrene, %	23.5	23.5
Conversion, %	68	60
Mooney viscosity, ML, 1 + 4, 212°F., polymer	50	52
Coagulation	SA	SA
Finishing	normal	normal

Note: Abbreviations and symbols are defined as follows:
FA = fatty acid
FRA = free radical type, i.e., iron-pyrophosphate, peroxamine sulfoxylate
ND = Non-discoloring
NST = Non-staining
OHP = Organic hydroperoxide
P = Persulfate
RA = Rosin acid
SA = Salt-acid

[1] RUBBER WORLD, Aug., 1957, p. 718.

Tire Business 45% Increase in Ten Years Predicted

Passenger-car tire replacement sales should reach a figure of 80 million units, and truck and bus tire sales add another 11 million units by 1967, H. E. Humphreys, Jr., chairman of the board of U. S. Rubber Co., predicted in mid-October in Cincinnati, O., during the convention of the National Tire Dealers & Retreaders Association. Passenger-car tire replacement business for 1957 is estimated at 55 million units.

Mr. Humphreys said the replacement tire business would enjoy this expansion despite the fact that tire quality is continually improving, because the nation is in a period of dynamic growth, and population in 1967 would total 200 million persons. He added that in the next 10 years our gross national product will increase close to 50% to reach a total of about $600 billion. This means a sharp increase in motor transport of goods from factory to consumer, with consequent benefits to the replacement tire business, he added.

People will have more automobiles and drive them greater distances by 1967, and passenger-car registrations for that year were estimated at 70 million. This bright future for the tire manufacturer and dealer will require that both try to meet the needs of the consuming public to the best of their ability, however, and keep pace with developments in auto and truck design, this rubber industry leader said in conclusion.

E. F. Tomlinson, president of the B. F. Goodrich Tire Co., keynote speaker at the NTDRA convention, told the tire dealers that their business should increase 6% in 1958. He said that although the nation's motorists will spend nearly $1.5 billion for replacement passenger tires in 1957, this amount is only $1 out of every $200 spent for consumer goods at the present time.

Tire dealers have a new responsibility, Tomlinson said, and that is to learn motorists' driving habits and recommend tires that will give safe service. High-speed driving requires tires with an extra margin of safety, and "bargain" tires, satisfactory for driving at moderate speeds, should not be recommended if any amount of high-speed driving at turnpike speeds is a possibility.

Basford Italian Agent

Montecatini, Societa Generale per l'Industria Mineraria e Chimica, Milan, Italy, one of the world's largest chemical, mining, and metallurgical companies, has appointed G. M. Basford Co., New York, N. Y., to handle public relations in the United States for the company's newly discovered "isotactic" polymers. Montecatini, which pioneered in the development of these new synthetic and plastics materials, has just begun production of "isotactic" polypropylene to be marketed under the trade name, "Moplen." At present "Moplen" polypropylene will be used for various plastics applications, but other uses are under development.

News Briefs

C. K. Williams & Co., Easton, Pa., which recently moved its New York metropolitan area district sales office to Newark, N. J., reports that it has installed a direct Manhattan line for the convenience of customers in New York, N. Y. The number is WOrth 2-5150.

A. M. Byers Co., in which The General Tire & Rubber Co., has a majority interest, is entering the plastic pipe field. Byers has produced only wrought-iron and steel products in the past. The rigid polyvinyl chloride pipe will be manufactured by General Tire's Bolta division and marketed by Byers.

Pliovic latex 300, produced by the chemical division of the Goodyear Tire & Rubber Co., Akron, O., currently is being used in non-woven binder systems by Sackner Products, Inc., Grand Rapids, Mich., in the manufacture of Safoam non-woven fabrics for use in the automotive industry as door panel padding. Pliovic latex 300 is an aqueous dispersion of vinyl chloride polymer made at high solids by modern emulsion polymerization techniques. In the Sackner application the non-woven fabric is dielectrically bonded to fiberboard panels to assure a complete and uniform seal and exhibits necessary strength, resilience, and dimensional stability.

Davol Rubber Co., Providence, R. I. has entered the "baby bottle market" with a rigid (low-pressure) polyethylene bottle made from Marlex 50, produced by Phillips Chemical Co.

American Hard Rubber Co.'s executive, sales, and accounting departments, formerly at 93 Worth St., N. Y., have been moved to a newly constructed office building adjacent to the company's plant in Butler, N. J. The company is a major manufacturer of storage battery components, corrosion-resistant chemical processing equipment, industrial parts, bowling balls, and Ace combs.

Barrett Division, Allied Chemical & Dye Corp., New York, N. Y., has announced that new facilities for the volume production of refined anthracene are in operation at its Ironton, O., plant. Anthracene is well-known as a chemical from which anthraquinone and other intermediates can be made for subsequent use in the manufacture of a variety of synthetic dyestuffs. Its uses are suggested for synthesizing resins, tanning agents, new non-resinous plasticizers, dyes, pharmaceuticals, adhesives, and paper chemicals.

Witco Chemical Co., Canada, Ltd., Toronto, Ont., is erecting a new plant for the production of metallic stearates. This plant, southwest of Toronto, is expected to be completed early in 1958 and marks the first step in Witco Canada's plans for manufacturing facilities. The company is negotiating for a license from Witco Chemical Co. in the United States for use of the parent company's production know-how. Metallic stearates find wide application as waterproofing agents, gelling agents, lubricants, and paint flatting agents.

Eastman Chemical Products, Inc., Kingsport, Tenn., has changed the name of its Tenamene 30 and 31 to Eastozone 30 and 31. The chemical description of these two rubber antiozonants are: Eastozone 30—N,N'-di-2-octyl p-phenylenediamine; and Eastozone 31—N,N'-di-3-(5-methylheptyl) p-phenylenediamine.

Riegel Paper Corp., New York, N. Y., has added a new release and separating paper to its line of coated, laminated, and resin impregnated papers. It is designated as Riegelease "G" and provides efficient release from most pressure-sensitive adhesives, rubber and asphalt compounds, and plastic resins. The company is currently producing eight different release and separating papers to satisfy varying functional requirements. Riegelease "G" was perfected at Riegel's developmental laboratory at Milford, N. J.

United States Rubber Co., textile division, New York, N. Y., has announced that production capacity for Trilok upholstery fabrics has been expanded by 50% to meet demand from the automotive, furniture, and transportation industries. It was reported that the three-dimensional fabric will appear on the 1958 models of three auto manufacturers. It has also been adopted by several aircraft manufacturers and by some railways.

Interchemical Corp.'s second motion picture on the subject of color, "Color Magic," has been released for showings to industry, college, and artist design groups throughout this country. This new 22-minute, 16 mm. sound movie illustrates some of the more important principles involved in using color in industry, in design, and in the home. It is a companion movie to "This Is Color," the company's motion picture treating the physics of color, released last year. Arrangements for borrowing these films may be made through the company's representatives, or through its headquarters, 67 W 44th St., New York 36, N. Y.

Taylor, Stiles & Co., Riegelsville, N. J., has announced that improved design features have been incorporated in its pelletizers. To give the cutting element of its 700 series pelletizers more rigidity and to make the whole machine more compact, a cartridge-type roller bearing, mounted in a housing which is an integral part of the machine base, has replaced the separate housing and ball bearing formerly used. To facilitate cleaning of the feed rolls, and around the stationary cutting edge or bed knife, the feed-roll assembly has been redesigned to make for easier removal of the roll.

B. F. Goodrich Chemical Co., Cleveland, O., has developed a new men's tropical-weight suiting fabric combining Darlan with worsted. The new fabric, named "Velo-Touch," will be used in men's tropical suits exclusively by Pincus Bros-Maxwell, Inc., of Philadelphia. Darlan is a dinitrile fiber that differs chemically from any man-made fiber now on the market. It was first introduced on a limited scale in high-pile women's coats and has since been used in women's coats, sweaters, and hand-knitting yarns. The chemical firm recently announced that it plans to triple the existing semi-works facilities for Darlan at Avon Lake, O.

United States Department of Commerce has issued a commercial standard for reinforced plastics corrugated structural panels. This standard, effective October 16, has been developed over the last several years by the Fiberglass Reinforced Panel Council of The Society of the Plastics Industry, Inc., and the Plastics Section of the National Bureau of Standards of the Commerce Department. Among other requirements, this standard covers methods of test for bearing load, transverse load, flammability, appearance, and color uniformity. It is the tenth Voluntary Commercial Standard on Plastics developed through the joint efforts of SPI and the Department of Commerce. Ten different plastics standards and a sample of a plastics product were on exhibit from September 17 through October 17 in a Standards Exhibit in the lobby of the U. S. Department of Commerce Building, Washington, D. C.

Tennessee Products & Chemical Corp., Nashville, Tenn., has announced that benzoguanamine, an organic chemical adaptable for a wide variety of uses in rubber processing, is now available commercially in the United States for general industrial use. The company is also producing benzonitrile in commercial quantities. Benzonitrile is a basic chemical used in the production of benzoguanamine and also is widely adaptable for a variety of process industries including organic synthesis, plastics, rubber, pharmaceuticals, and synthetic coatings. Resins containing benzoguanamine are particularly serviceable in the manufacture of industrial finishes, plastics, paper products, adhesives, textile finishes, and molding compounds. Benzoguanamine also has potential uses as a chemical intermediate for applications such as dyeing, rubber vulcanizing, therapeutic agents, and fire retardants.

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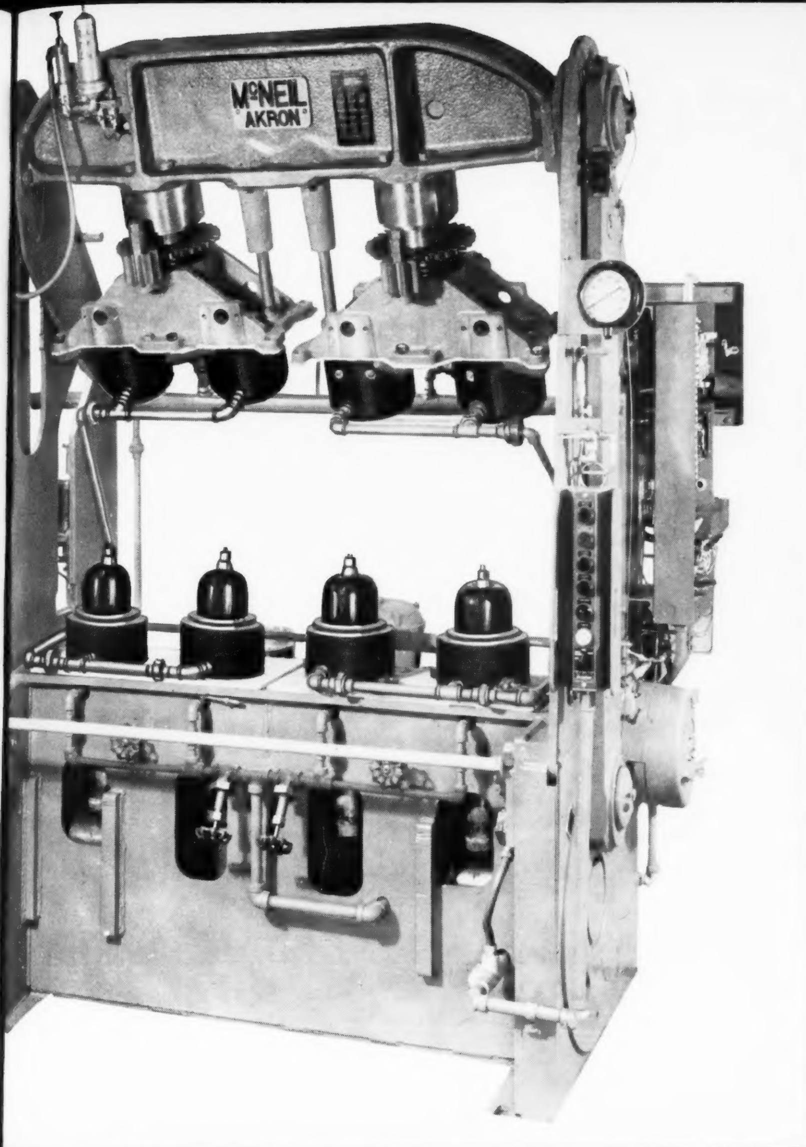
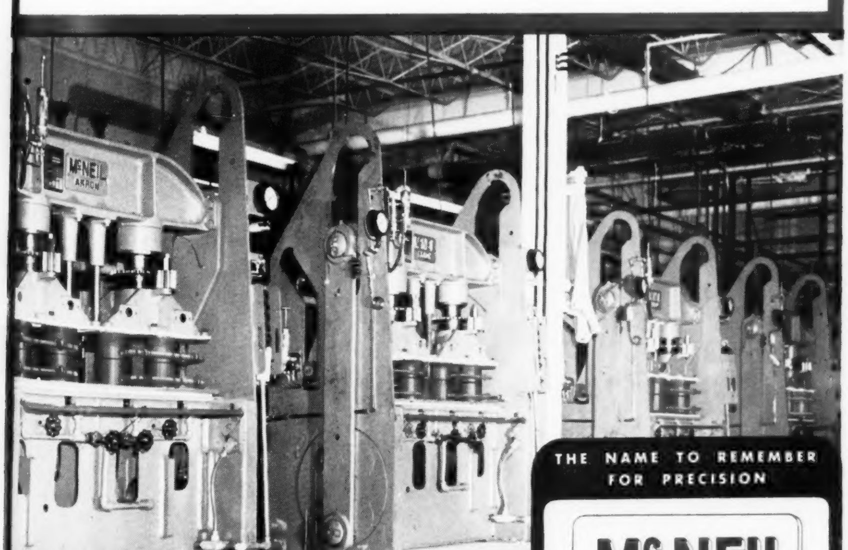


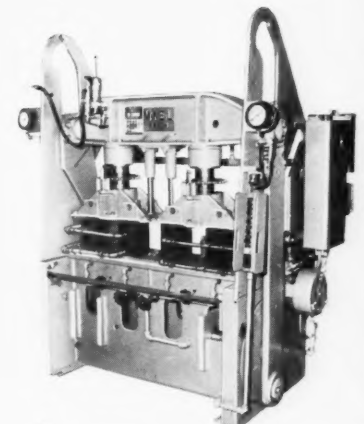


Typical installation of a battery of air spring presses in operation.

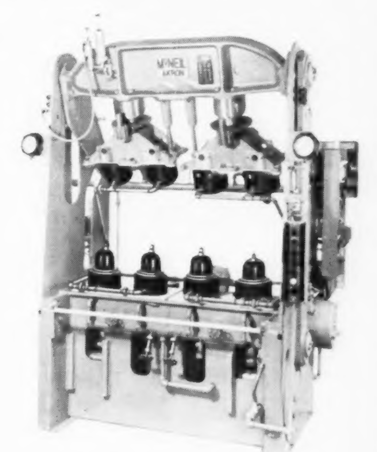
THE NAME TO REMEMBER FOR PRECISION

McNEIL
AKRON

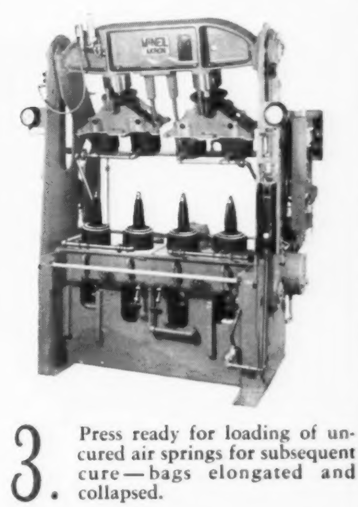
Manufacturers of the World's Finest Rubber Curing Equipment



1. Press closed during cure cycle, using two-piece steam-jacketed molds.



2. Press fully open, products ready for removal. Note top head tilted toward rear to facilitate loading and unloading.



3. Press ready for loading of uncured air springs for subsequent cure — bags elongated and collapsed.

Columbian Carbon Co., New York, N. Y., recently completed studies on improving efficiency and economy in shipping, handling, and warehousing carbon black in bags for and by users. The studies have developed a variety of palletizing patterns for bags to fit effectively both cars or trucks during shipment and adapted to customers' facilities for storing and using carbon black. Previous improvements in packaging and shipping carbon black have included beading blacks for bulk shipment and handling, and polyethylene overslips to give complete protection to bagged carbon black against atmospheric moisture.

Montecatini's Ferrara plant, Italy, is now commercially producing a radically new thermoplastic called Moplen (R), which is made from a petroleum by-product, low-cost propylene gas, by a low-pressure catalytic process. This new plastic will appear on the American market next year in the form of sterilizable opaque to translucent household products, squeeze bottles, baby bottles, pipe and fittings, and in textile machinery parts, electrical and mechanical components such as tape-recorder housings, pump parts, automotive parts, and the like. The basic process discovery can also be applied to other alpha-olefins. Many are now under study at Milan. Other forms of polypropylene unsaturated hydrocarbons are suitable for extrusion into fibers and films and rubbers.

The Pantasote Co., Passaic, N. J., is manufacturing a new plastic matting called "Life-Tred," now available in retail, chain and variety, hardware, and mail-order stores throughout the nation. The product comes in clear and in the following colors: black, green, gray, beige, brown, red and yellow, pink and white. This product was primarily intended for protection of carpet and floor surfaces. In addition, it has received wide acclaim for a variety of uses such as car matting, wall protection, drain boards, table place-mats, shelf linings, and others.

Armstrong Cork Co., industrial division, Lancaster, Pa., has developed a new material for automotive lamp gaskets that is reported to have excellent ozone resistance, low water absorption rate, and a high degree of compressibility. The new material, called Armstrong YK950, will compress 25 to 40% under a flange load of only 40 psi. YK950 is compounded of sponged butyl synthetic rubber and ground cork. Butyl gives the material good resistance to ozone; while the cork particles give it resilience.

Goodyear Tire & Rubber Co. is in volume production of automobile rubber air springs at its Akron, O., plant. Production is centered in Goodyear's industrial products plant which has facilities for turning out many thousands of these complicated assemblies per day. The company has a large technical staff to coordinate design and development work with automotive manufacturers, which is still going forward at a rapid pace.

Borden Co.'s chemical division, Peabody, Mass., has solved the problem involving the adhesion of vinyl plastisols and organosols to nylon base fabric. It has developed three ARCCO-brand bond coatings specifically designed for obtaining high-strength, flexible bonds of plastisol and organosol film to nylon, and many other synthetic fibers. Adhesion values for plastisol films exceed 20 pounds' peel strength per two-inch width.

Perma Industries, Inc., Los Angeles, Calif., unveiled a new basic synthetic material applicable in the manufacture of hundreds of consumer and industrial products at the Hotel Pierre, New York, N. Y., October 15. The new synthetic, called porelon, is the first man-made material which, in the manufacturing process, can be permeated with a liquid which will be given off at a controlled rate as needed when the finished product is used. This is the leading factor enabling it to be used for products ranging from lipsticks, corn plasters, and self-lubricating machinery bearings, to chemical and medical package-applicators, insect control and plant fertilizer devices, office equipment, and room deodorizers.

The Monarch Rubber Co., Hartville, O., has opened a new midwestern district office and appointed Bert S. Hough as midwestern district manager. This new office, at 2353 N. California Ave., Chicago 47, Ill., has been established to serve the states of Illinois, Iowa, Minnesota, Missouri, and Wisconsin. Mr. Hough will be responsible for sales and service on Monarch's industrial solid and Mono-Cushion press-on tires for materials-handling trucks as well as molded mechanical rubber goods.

Major rubber tire manufacturing companies raised prices of original-equipment tires for passenger cars and trucks 2%, effective October 1. The move was prompted by rising production costs, among which was the wage increase granted production workers in July. Prices for replacement tires have already been increased since the mid-summer wage increase.

U. S. Rubber Reclaiming Co.'s president, C. H. Peterson, has been issued United States patent No. 2,804,651, covering an improved method of producing reclaimed rubber. The invention relates to a continuous means of extruding rubber at a relatively low temperature and under relatively low pressure and provides a product of improved tensile strength, viscosity, and modulus, the patent states.

United States Rubber Co.'s mechanical goods division has selected W. S. Nott Co., Minneapolis, Minn., as its exclusive distributor throughout the upper Midwest. This appointment made Nott the largest distributor of mechanical rubber products in the United States. The company's industrial distribution area includes Minnesota, North Dakota, South Dakota, western Wisconsin, Michigan, and Montana.

The Firestone Tire & Rubber Co.'s Orange, Tex., butadiene plant, although in operation only four months, is under consideration for expansion. The plant is the first to be built by a rubber company for production of the principal raw materials for synthetic rubber. The butadiene plant with a yearly capacity of 40,000 tons supplies a substantial portion of the butadiene for the company's synthetic rubber plants at Lake Charles, La., and Akron, O. The Lake Charles plant has a capacity of 190,000 tons of synthetic a year, and the Akron plant has a capacity of 40,000 tons a year.

B. F. Goodrich Industrial Products Co., Riverside, N. J., has started production of a new surgeon's glove that is said to reduce hand fatigue by requiring 25 to 30% less energy to flex the fingers and hands than do ordinary surgeon's gloves. Called Surgiderm, the new glove was introduced early this year as an experimental model under another trade name. Tests against other gloves, claims the company, show that the Surgiderm is from 30 to 60% softer than ordinary surgeon's gloves.

Harold H. Radke has been named a development program analyst for B. F. Goodrich Chemical Co., Cleveland, O. The new position is being created to assist in the selection of research and development projects for the company. He will work in conjunction with B. M. G. Zwicker, director of new products planning. **A. L. Schultz** has been appointed manager of rubber and rubber chemicals development Goodrich Chemical's development center at Avon Lake, O. He succeeds **Edwin W. Harrington,** who was recently named plant manager of the company's Akron Chemicals plant.

W. White, formerly in charge of Kleinert's Canadian operation, is forming his own sales agency, with headquarters in Toronto, Ont., Canada, to specialize in marketing packaged soft goods and fashion merchandise. Mr. White, who recently resigned from I. B. Kleinert Rubber Co. as New England sales manager, has worked in the Canadian market for the past six years, where he is well known in the infants', smallwares, and sportswear fields.

Frank E. Harper, plant manager in charge of manufacturing at B. F. Goodrich Tire Co.'s Los Angeles plant, has been appointed director of employe relations for the tire company, with his headquarters in Akron, O.

Thomas A. Bissell has been appointed executive secretary of the Society of Plastics Engineers, Inc., Greenwich, Conn. He brings to his new assignment 21 years' experience as a key staff member of the Society of Automotive Engineers. From 1943 until 1957 he was manager of SAE's meetings division, with staff responsibility for the development and operation of SAE's eleven national meetings and three displays. From 1936 until 1942 he was technical editor of the *SAE Journal.*

News About People

T. M. Mayberry, executive vice president, has been elected president of Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont. The appointment of **R. I. Raycroft** to the position of vice president-sales, and **D. R. Caskie** to the office of treasurer, was also announced. Caskie assumes his new position as treasurer after 29 years in the company's administration and finance division, most recently as assistant treasurer.

Don J. Paul has been named sales manager of Gro-Cord Rubber Co., Lima, O., manufacturer of Gro-Cord soles and heels. **E. L. Babcock,** a veteran of several years in bottom stock sales, will take over as sales promotion manager of the firm, in addition to continuing field sales activities. **Charles E. Clarke** has joined the company as sales representative in New York State, with his headquarters in Endicott, N. Y.

R. K. Turner has been appointed president of Bakelite Co., Division of Union Carbide Corp., New York, N. Y. He succeeds **George C. Miller,** now president of Union Carbide Realty Co. **Stanley A. Corfman,** former president of Union Carbide Realty, reaches normal retirement age next summer. Turner has been vice president of Bakelite Co. since 1952; Miller has been president of that company since 1953.

M. S. Meyer, a former member of the Goodyear Tire & Rubber Co.'s Akron organization, has been named managing director of Goodyear-Great Britain in top level management changes. He succeeds **A. S. Bishop,** now chairman of the board of the company's Great Britain organization. Meyer moves to the top management post from the position of sales director. Elected to succeed him is **A. H. Pendree,** former sales manager.

L. D. Dougan, plant manager, has been elected vice president-operations; **Stanley Wilk,** treasurer, has been made vice president-finance; and **Roger E. Hatch,** general sales manager, has been named vice president-marketing, for Polymer Corp., Ltd., Sarnia, Ont., Canada.

James L. Killian, Jr., has been appointed manager of technical services in Europe for International B. F. Goodrich Co., a division of The B. F. Goodrich Co., Akron, O. Killian, who will headquarter in The Hague, Holland, recently completed a three-year assignment as a senior technical man at the company's associated plant in Enschede, Holland.

Fabian Bachrach

John W. Perloff

John W. Perloff, with Godfrey L. Cabot, Inc., for the past five years, has joined Golden Bear Oil Co. as sales development manager for the chemicals division. This new position has been created by the accelerated expansion and diversification program of the company. Golden Bear Oil Co., manufacturer of standard grades and custom-made petroleum products, recently doubled its facilities for its whole line of products, which include plasticizers and extenders for the rubber and plastics industries.

Selwyn R. Mather, formerly with United States Rubber Co., has joined the research and development staff of The Richardson Co., Melrose Park, Ill., where he will supervise the development of molded products and molding compositions.

John A. Sargent has resigned as president and a director of Diamond Alkali Co., Cleveland, O. His presidential duties and responsibilities have been assigned to **Raymond F. Evans,** chairman and chief executive officer of the company for the past three years. In addition, **A. H. Ingley,** senior vice president, has been assigned the newly created post of executive vice president.

G. Gruschow has been named manager of Dayton Rubber Co., Ltd., Toronto, Ont., Canada. With Dayton of Canada since 1949, he has served successively as chemist and works manager. The company also appointed **Ross Robinson** chemist at its Toronto plant.

Lombardi

George W. Smith

George Warren Smith has been named to succeed **W. H. Zillessen,** who recently retired as manager of the New England district of the elastomer chemicals department of E. I. du Pont de Nemours & Co., Inc. Zillessen became New England manager of the department's rubber chemicals division in 1955, remaining in Boston, Mass. when the dyes and chemicals division moved its office to Providence. R. I. Smith, in 1952, became assistant manager of the New England district of the rubber chemicals division and retained that post when the division became the elastomer chemicals department in January of this year.

W. H. Funston has been elected chairman of the board, Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont. He has served on many boards of directors and has been active in the Canadian Chamber of Commerce and the Canadian Manufacturers Association, and is the immediate past president of the Rubber Association of Canada.

Frederick L. Bissinger, vice president in charge of research, has been elected to the newly created position of group vice president—marketing and research, Industrial Rayon Corp., Cleveland, O. **Moses P. Epstein,** vice president in charge of merchandising, has been elected vice president in charge of marketing, and **Gilman S. Hooper,** manager of the high polymer research division, has been named director of research for the company.

Walter Blatt, Wellco Shoe Corp.'s sales representative in northern California and Nevada, has retired and is being replaced by **Michael J. Lupo.**

Robert F. Smith has been elected executive vice president of Worthington Ball Co., Elyria, O. manufacturer of golf balls. His new position will include authority and control over sales, production, engineering, research, and development, and in general over the operations and affairs of the company under the general supervision of the president, H. M. Naugle.

Robert E. Mulcahy has been reassigned from Caprolan polyamide fiber sales to the product development staff, National Aniline Division, Allied Chemical & Dye Corp., New York, N. Y. Previously he had served the New England territory for fiber sales and service.

Charles H. Churchill, general manager of Pacific Polymer since 1955, has been elected executive vice president and general manager of the company. Pacific Polymers is a subsidiary of American Latex Products Corp., Hawthorne, Calif., and is gaining nation-wide prominence in the manufacture of latex and plastic compounds as well as coatings.

E. W. Maass has been appointed New England representative for Industrial Ovens, Inc., Cleveland, O. The company designs, manufactures, and installs continuous materials handling and processing systems, generally involving the engineered application of heat, for the plastics, rubber, paper, textile, film and wire industries. Maass' mailing address is Box 73, East Hampton, Conn.

Donald C. Giles, branch manager of Pureco's Seattle district, has been named district manager at Berkeley, Calif. Pure Carbonic Co., a division of Air Reduction Co., Inc., New York, N. Y., is a major producer of carbon dioxide in liquid, gaseous, and solid ("Dry-Ice") forms for wide applications in industry.

Arthur H. Nellen has been elected to the board of directors, Lee Rubber & Tire Corp., Conshohocken, Pa. He will fill a vacancy caused by the death of **George S. Mahanna.** Well known in the tire and rubber industry field, Mr. Nellen is also a member of the American Chemical Society; the Franklin Institute, Philadelphia; the American Society for Testing Materials; and was chairman of the New York Rubber Group in 1939. During World War II he was appointed to the War Production Board and placed in charge of the division of the Rubber Director's Office for the conversion of the tire industry from natural to synthetic rubber. During the same period he was in charge of all government sponsored tire testing.

Agmund K. Thorsrud, who has 10 years of experience in the rubber industry, has been employed by Phillips Chemical Co., a wholly owned subsidiary of Phillips Petroleum Co., as a technical representative to assist **Jan Willums,** European sales manager for the company's carbon black and synthetic rubber. His headquarters will be in Zurich, Switzerland, where the company maintains an office. He is former director of research and development at the central laboratories of A/S Askim Gummivarefabrik of Norway.

Henry C. Heine, new sales manager of Hamilton Rubber Mfg. Corp., Division of Acme-Hamilton Mfg. Corp., Trenton, N. J., will direct the sales of Hamilton industrial rubber products—hose, conveyor belting and packing—which are sold through industrial supply distributors.

Joseph R. Augello has joined the purchasing department of Witco Chemical Co., New York, N. Y. Formerly a sales representative with the Washine Chemical Corp., Augello has had long experience in the chemical industry.

E. W. Maass

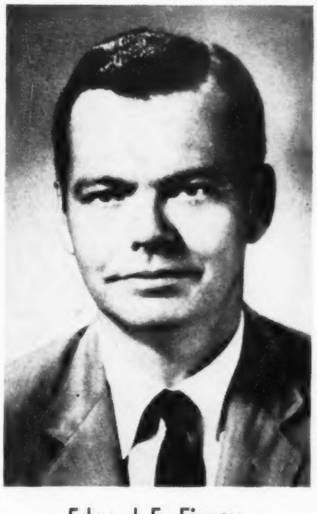
Arthur H. Nellen

Joseph R. Augello

A. G. Steinbrenner has been appointed manager, sales and production coordination, a new department, and **G. A. Pominville** has been appointed acting plant engineer, succeeding **H. F. Greeney,** at Latex Fiber Industries, Inc., Beaver Falls, N. Y.

James M. Robbins has been appointed manager of the Los Angeles, Calif., plant of B. F. Goodrich Tire Co. He moves to his new post from manager of manufacturing for the company, with headquarters in Akron, O.

Edward E. Finney has joined Pittsburgh Coke & Chemical Co., Pittsburgh, Pa., as a sales representative in the firm's industrial chemicals division. He will handle sales of the company's industrial chemicals in eastern New Jersey, Brooklyn, and Long Island, N. Y.



Edward E. Finney

Howard D. Hartough has been named general manager of the Girdler catalyst department of National Cylinder Gas Co., Louisville, Ky. Since 1954, Hartough has been assistant to the general manager of the Houdry Process Corp., Philadelphia, Pa.

Linwood A. Walters has been appointed to the newly created post of manager of research and development, National Vulcanized Fibre Co., Wilmington, Del. A chemical engineer, Walters for the past three years had been development manager of the Durite department of the Borden Co.'s chemical division.

Jack D. Cape, has been named manager of belting and hose sales, industrial products division, B. F. Goodrich Canada, Ltd., Kitchener, Ont. Transferring to industrial products in 1954, he most recently was sales engineer for belting and hose.

Philip G. Connell, Jr., has been named assistant general manager, pigments division, American Cyanamid Co., New York, N. Y. He previously held posts as a development engineer in process improvement and new products development and in sales capacities for the intermediates and chemicals and the intermediates and rubber chemicals departments of the company.

James C. Kirk, formerly research supervisor for the petrochemicals research division of Continental Oil Co., has been named director of research for Petroleum Chemicals, Inc., and will be headquartered at Lake Charles, La. Petroleum Chemicals, Inc., is owned equally by Cities Service and Continental Oil companies and presently manufactures butadiene and is currently completing plants to produce synthetic ammonia, ethylene, high-purity propylene, ethylene glycol, and ethylene oxide.

Philip G. Connell, Jr.

R. Emerson Lynn, Jr., former senior technical man, has been named manager of chemical engineering research at the B. F. Goodrich Research Center, Brecksville, O.

Richard W. Stickney has been appointed manager of commercial research of Hewitt-Robins, Inc., Stamford, Conn. He has had 11 years' experience in commercial research and marketing in the industrial field.

M. J. Katis and **J. A. Reeves** have been appointed vice presidents of the Dryden Rubber Division of Sheller Mfg. Corp. Katis will serve as general manager of the Chicago, Ill., plant of the company's Dryden Rubber Division; while Reeves will be general manager of Dryden's Keokuk, Iowa, plant. **O. G. Vinnedge,** vice president in charge of operations of the Dryden Division, has resigned.

R. S. Walker

Joseph A. Neubauer

E. R. Rowzee

R. S. Walker has been appointed to the rubber department of the Goodyear Tire & Rubber Co.'s chemical division. He has been designated sales engineer for Chemigum rubber and in this capacity will be concerned with sales and technical services of nitrile rubber. In addition to the Chemigum line, the rubber department markets Plioflex styrene rubber, Pliolite reinforcing resins, Wing chemicals, and Rubarite asphalt additives.

T. Patrick Dougan has been elected executive vice president and general manager, and **Glen E. Mallory,** treasurer-vice president, American Latex Products Corp., Hawthorne, Calif.

Frank G. Hensel has been named administrative manager of the Robins Engineer Division of Hewitt-Robins, Inc., Stamford, Conn. Other new promotions include **Jack Van Kleunen** as manager of engineering sales; **Douglas H. Martini** as manager of engineering sales service; **E. H. Fallon** as contract manager; and **Robert W. Taylor** as chief estimating engineer of the rock products department.

Joseph A. Neubauer has been elected president of Columbia-Southern Chemical Corp., a wholly owned subsidiary of Pittsburgh Plate Glass Co., Pittsburgh, Pa. Formerly vice president, technical director and a member of the board of directors, Neubauer succeeds **Edwin T. Asplundh,** recently elected board chairman of the Pittsburgh Plate Glass Co. and Columbia-Southern Chemical Corp.

S. Robert Sweet and **John A. Bushee** have joined the coatings and adhesives department, chemical division, Borden Co., New York, N. Y. Sweet has been assigned to the department's sales staff, handling Placco-brand building materials in the Philadelphia area; while Bushee, formerly with General Latex Chemical Corp., has been assigned to Borden's latex laboratory in Peabody, Mass.

J. A. Blondon has been appointed division purchasing agent for rubber for Dominion Rubber Co. Ltd., Montreal, P. Q., Canada. He succeeds **L. T. Jones,** who has been made purchasing agent for textile fabrics, yarns, and leather.

J. D. Barrington has resigned as president and managing director of Polymer Corp., Ltd., Sarnia, Ont., Canada, to accept the position of president and managing director of Ventures, Ltd., a mining exploration company. Barrington, who was criticized in the last Parliament for also being a director of a private company, will continue as a director of Polymer. He is succeeded as president and managing director by **E. R. Rowzee,** vice president and manager of Polymer since 1951.

G. Allen Spaulding, production superintendent of the B. F. Goodrich tire plant in Oaks, Pa., has been named manager of the Miami, Okla., tire plant. He succeeds **Walter E. Head,** recently appointed manager of manufacturing of B. F. Goodrich Tire Co.

S. F. Palmer, manager, manufacturers' sales, has been appointed to the newly created position of assistant to the president, and **Frank Sommers,** Regina territory sales representative, to manager, manufacturers' sales, of Firestone Tire & Rubber Co. of Canada, Ltd., Hamilton, Ont.

William H. Betts

Elmer J. Collins

David Spence

William H. Betts has been appointed staff metallurgist at United Engineering & Foundry Co., Pittsburgh, Pa. He was formerly sales and service engineer in the roll division of the company.

William D. Gohr, an executive with more than 33 years' experience, has been designated sales manager for air springs, The Firestone Tire & Rubber Co., Akron, O. He will direct sales of "Airide by Firestone" for automotive and industrial uses and will coordinate selling efforts with the product engineering division of the company. He will have headquarters in Akron.

D. E. Laurin, sales representative for the last four years, has been appointed technical sales representative for the plastics & resins sales department, Monsanto Canada, Ltd., Montreal, P.Q., Canada. His transfer in responsibilities and activities has been occasioned by the increasing demand for specialized service in the plastics and resins field.

Herbert R. Erickson, a veteran in the plastics field, has joined the chemical division of the Borden Co. as development manager of its Resinite department, Santa Barbara, Calif. This department is a leading producer of polyvinyl chloride extrusions used for electrical sleeving, food handling and medical tubing, and garden hose and sprinklers.

Vern M. Coulson, for 13 years representative in Evansville, Ind., for Oakite Products; Inc., New York, N. Y., has been transferred to Fort Worth, Tex., as technical service representative. **Thomas A. Reilly, Jr.,** who recently completed an intensive eight-week training program at the New York laboratories and in the field, has been sent to Trenton, N. J.

Walter E. Head, manager of the B. F. Goodrich tire plant in Miami, Okla., has been appointed manager of manufacturing for B. F. Goodrich Tire Co., Akron, O. He became manager of the Miami plant when it was built in 1945.

Elmer J. Collins has been appointed product development engineer, Marbon Chemical, Division of Borg-Warner Corp., Gary, Ind. Collins, a retired U. S. Army Colonel, brings a long and varied background to his new post. He has held key positions in both industrial and military areas, including experience in engineering, product development, instrumentation, production, sales management, and chemical procurement.

Obituaries

David Spence

David Spence, noted pioneer in research and development on rubber and related subjects, died September 24 at 18 Gramercy Park South, New York, N. Y. Dr. Spence, who developed numerous important processes in the rubber field, would have been 76 on September 26.

He was director of research and development of the Diamond Rubber Co. and of the B. F. Goodrich Co. (which later purchased Diamond) in Akron, O., from 1909 to 1914. A cofounder of the Norwalk Tire & Rubber Co., Norwalk, Conn., Dr. Spence served as its vice president and general manager from 1914 to 1925. From 1925 to 1931 he was vice president in charge of research and development for the Intercontinental Rubber Co., New York.

During World War I the deceased was in charge of the rubber division of the National Research Council. During World War II he was consultant to the Office of the Rubber Director, War Production Board. He had retired from business in 1931 to concentrate on private research and biochemical studies on rubber and cognate subjects.

Born in 1881 at Udny, Aberdeenshire, Scotland, Dr. Spence was educated at Robert Gordon's College (Aberdeen), Royal Technical College and University (Glasgow), and the University of Jena (Germany), from which he received his doctorate in 1906.

Dr. Spence was the first Charles Goodyear Medalist of the Division of Rubber Chemistry, American Chemical Society, in 1941. (The medal was presented in 1948.) He was, besides, a member of the American Chemical Society and Society of Chemical Industry and a Life Fellow of the Royal Institute of Chemistry, of the Institution of the Rubber Industry, and of the Royal Society of Arts, all of Great Britain. He belonged also to the Chemists Club, New York, and the Cosmos Club, Washington.

A long-time resident of the Monterey Peninsula Country Club in Pebble Beach, Calif., Dr. Spence gave one of the most complete and extensive libraries on rubber to the University of Southern California in 1952.

Dr. Spence, after graduation from Jena concentrated on the science and technology of rubber. His notable accomplishments in this field include patented processes for improving inferior-grade rubbers, dyeing of rubber and rubber products, devulcanization, extraction of rubber from guayule, preparation of latex, treating latex and latex products, vulcanizing rubber and modified rubber.

Survivors include the widow, a son, a daughter, a sister and three grandchildren.

Service were held at Frank C. Campbell, Inc., New York, on September 28. Interment was in Scotland.

David P. Brannin

David P. Brannin, retired western district sales manager for The New Jersey Zinc Co., New York, N. Y., died September 19 at an Evanston, Ill., hospital. He was 69 years of age.

Mr. Brannin, who resided in Park Ridge, Ill., spent more than 32 years in the company's Chicago office, becoming district sales manager in 1946 and western district sales manager in 1949. He retired in 1954.

News from Abroad

Malaya

New SP Type Rubbers

In our October issue (page 119) a note was published in these columns on the progress being made in the production of Superior Processing (SP) Rubber. The September, 1957, issue of the *Planters' Bulletin* of the Rubber Research Institute of Malaya, just to hand, presents new details from which it appears that in addition to pale crepe, the form first produced, SP smoked sheet and SP air-dried sheet are now also being produced.

SP crepe has been made under license by East Asiatic Co., at Taiping, since November, 1955. Output in 1956 was about 54 tons, but was doubled in the first half of 1957, and further increases are expected. The gratifying results achieved with SP crepe led the RRI to attempt the preparation also of smoked and air-dried SP sheet in 1956. This was successfully accomplished, and in the first six months of 1957, 47 tons of SP RSS and 19 tons of SP air-dried sheet were shipped overseas.

The original process, somewhat modified, is used for both sheet and crepe. First a stable suspension in water is made of the vulcanizing ingredients by grinding the dry chemicals in a ball mill in the presence of water and a dispersing agent. The formula for vulcanizing 1,000 pounds of rubber (to obtain 5,000 pounds of SP rubber) requires: 20 pounds of sulfur, 7.5 pounds zinc oxide, two pounds zinc diethyldithiocarbamate, four pounds mercaptobenzothiozole, 0.4-pound Dispersol LR, and 48.1 pounds water, 82 pounds in all. In other words, 8.2% of the suspension on the weight of rubber present is needed for vulcanization.

After the dry rubber content is determined of the strained and ammoniated field latex and the correct amount of suspension added, live steam is injected to heat the latex so as to bring its temperature to 180° F. in one hour; the latex is kept at a temperature of 180-185° F. for about two hours. This vulcanized latex is then blended with diluted field latex (in the proportion of 1:5) and coagulated and further treated as for normal rubber.

The article referred to describes the plant needed for producing one ton of SP rubber daily; the plant is not extensive; the process is relatively simple to operate, and the extra cost for preparation works out at 1.35 cents per pound (Malayan currency) over that for normal sheet or crepe. Hitherto SP rubber has been sold at 1d. per pound above the price of the equivalent normal grade. When manufacture is fully established, the Rubber Research Institute points out, the laws of supply and demand will determine the premium which SP rubbers deserve.

Fragmentation Again

A new danger that could result from fragmentation was brought out in a report by the Rubber Industry Replanting Board, for 1956, on the smallholders' replanting scheme. This plan suggested the possibility that old rubber land might be broken up to enable buyers to participate in the smallholders' replanting scheme, which entitles them to a replanting grant of $600 an acre. The lots could then be resold and reconstituted as an estate, thereby avoiding contributions to the smallholders' replanting scheme when the estate went into production.

Fragmentation increased during 1956; it occurred mainly in Province Wellesly, Kedah Perak, Negri Sembilan, and Johore. Since there are difficulties in the way of obtaining land in some states, the lots are easily disposed of. This situation, incidentally, seems to give added strength to arguments in favor of revision of land policies in those states which make it hard to acquire new land.

The Minister for Natural Resources, Inche Bahaman bin Shamsuddin, revealed in the Federal Council that 50,000 acres of rubber—half of which are in Province Wellesly—have been split into small lots or sold for this purpose since the end of 1954. A departmental committee set up to consider effects of fragmentation on drainage works, roads, and water supplies, has sent in an interim report which indicates that splitting of estates did not necessarily have any harmful effect on the agricultural, economic, or social well-being of the Federation.

New Planting of One Million Acres Urged

On several occasions recently, voices have been heard urging the government to alienate new land for rubber planting, and relatively modest acreages were usually implied. It has been left for the Rubber Trades Association of Malaya to come out with the plea for the opening up of 1½ million acres of virgin jungle for planting high-yielding rubber trees. The Federation Minister for Commerce & Industry, Tan Siew Sin, has agreed that to meet the increased demand for rubber, Malaya should plant at least one million acres of new rubber in the next ten years. Mr. Tan, however, quickly made it clear that this was his personal opinion.

Various rubber planting companies have welcomed the idea, adding the further argument in its favor, that work must be found for the steadily increasing population of Malaya, essentially an agricultural country.

The chairman of the Rubber Producers' Council, S. N. King, who also agreed with Mr. Tan, is quoted as saying that if the growing demand for rubber could not be met by the natural product, synthetic would fill the gap. But he pointed out that it would cost about $1,000 (Straits) an acre to open up a rubber estate as envisaged; furthermore that land policies of certain states were not calculated to encourage large-scale new planting, and that these would have to be revised.

According to the "Malaya Rubber Statistics Handbook for 1956," recently published, the area of land under rubber cultivation in the Federation of Malaya came to about 3,500,000 acres at the end of last year. This figure is only approximate, since no accurate statistics are obtainable for smallholdings, that is plantations under 100 acres. Indeed, since 1946, the planted acreage of smallholdings has been estimated at 1,500,000 acres, each year. As to estates larger than 100 acres, these numbered 2,458 at the end of 1956 and had a total of 2,007,623 acres planted with rubber.

Producers United Front?

A united front of rubber-growing countries in southeast Asia, to counteract "highly organized and over-fastidious buyers," was called for at the annual general meeting of the Federation of Rubber Trades Association by its president, Heah Joo Seang. Mr. Heah suggested that Malaya, Indonesia, Siam, Burma, Vietnam, India, and Ceylon should meet in Kuala Lumpur at an early date to discuss problems of mutual interest. It was suggested that a confederation be set up, and an international meeting held to discuss vital issues.

He warned that higher taxation was inevitable now that Malaya was independent, but added the hope that the government would give due consideration to the plight of the rubber industry so that it would not be taxed out of existence. He also suggested that the director of the National Rubber Bureau in Washington be invited to visit Malaya on a fact-finding mission.

Great Britain

Rubber vs. Leather Soles

Almost simultaneously with a French motion against rubber footwear, a publicity campaign was launched in England to discourage the wearing of rubber and rubber-resin soling. At a meeting of National Federation of Boot Trades Associations, it was claimed that a report by the British Boot, Shoe & Allied Trades Research Association showed that resin-rubber and rubber soles had an adverse effect on children's feet. It seems, however, that conclu-

sions arrived at (from results of what was admittedly a trial on a very small scale—only 12 children participating in the tests) by the Research Association mentioned, although they cannot be said to have favored rubber soling, were not properly interpreted by those interested in leather products.

The Rubber & Plastics Age consequently announced (May, 1957) that since there is a dearth of reliable data on the subject, it proposes to prepare an independent survey in which all available information will be summarized, and suitable evidence and comment on the use of rubber and rubber-resin materials in footwear are invited from readers, particularly from research associations.

Debonding Process

A method of debonding rubber-to-metal components, based on the principle of destructive distillation in a closed vessel in the absence of air, has been developed by the chemical engineering division of W. C. Holmes & Co., Ltd., Huddersfield.

The components, to a weight of 10 to 15 cwts., are loaded into a container and from there into a cylindrical retort, the cover of which is sealed. A gas-fired furnace provides the heat for distillation of the rubber, which requires about seven hours at temperatures not allowed to exceed 500° C.; no fumes or smoke is emitted during the process. The products of distillation are (1) gaseous, which it is intended eventually to reuse for the furnace; (2) a thin, smelly tar, with high calorific value, which is to be used for heating the furnace setting; and (3) a carbon residue. The metal parts, freed from rubber, are easily cleaned by a barrel tumbling process.

Silicone Rubber Products

A new factory, designed exclusively for the production of silicone rubber compounds and products, has been opened by Precision Rubber, Ltd., Bagworth, Leicester, to meet the demands of the aircraft, engineering, and nuclear energy industries. A new range of silicone rubbers of greater strength and improved tear and oil resistance will be introduced.

Rubber-Plastics Convention

The Institute of the Rubber Industry and the Plastics Institute will hold their first joint conference on February 27, 1958, in London, when the subject will be "Recent Advances in Polymer Technology."

Synthetic Rubber Imports

As in 1957, United Kingdom rubber manufacturers will again be allowed to import a total of 80,000 tons of synthetic rubber during 1958, including 60,000 tons of SBR rubber and 20,000 tons of special-purpose rubbers. These amounts, however, are subject to review if the needs of the industry prove greater than provided for.

Rubber Bearings for Bridges

The BRPRA, in collaboration with Andre Rubber Co., Ltd., has developed a method of using specially designed rubber blocks for supporting the ends of bridges on the piers or abutments, instead of the usual roller bearings or steel plates. These rubber bearings, to be used on two new bridges about to be constructed, consist of large blocks of rubber interleaved with steel plates; they come in two sizes, 24 by 16 by 7⅛ inches, with nominal capacity of 100 tons, and 11 by 16 by 7⅛ inches, with nominal capacity of 50 tons.

Russia

One Million-Ton Synthetic Rubber Capacity by 1960?

The USSR and satellite countries together expect to produce a total of almost one million tons of synthetic rubber by 1960, when the current five-year plan ends. By that time the output of Soviet Russia is scheduled to have increased 120%, to reach 777,000 tons annually; that of Eastern Germany by about 40%, to 100,000 tons, and that of Poland and Rumania to 50,000 tons each. To achieve this goal, existing plant has been undergoing expansion, and new installations are to be built.[1] The Chemical Combine at Oswiecim (Auschwitz), Poland, is to produce 36,000 tons of synthetic rubber by the end of 1958.

It is further learned that Poland's rich coal deposits will be more fully exploited during 1955-1960 to advance the chemical industry, and not only is the output of synthetic rubber to be pushed, but also that of various basic materials like urea, melamine, formaldehyde, synthetic alcohols, etc., to enable Poland to make the necessary progress in the plastics industry, a field in which she seems to be considerably behind other countries.

Expansion in Rumania's synthetic rubber and plastics production will be based on her considerable resources in oil—production of which is said to have reached almost 11 million tons in 1956. In the plastics field, it is planned to produce polyethylene, polymethacrylate, and polystyrene, and special attention will be given to copolymers of styrene.

[1] *Plaste u. Kautschuk*, June, 1957, p. 230.

Soviet Russia

SKI—Polymerized Isoprene

Russian chemists are experimenting with Ziegler-type catalysts in the polymerization of isoprene, according to a recent Russian report on synthetic rubber research.[1] It seems that by this method a very pure *cis* 1-4 polyisoprene resulted, referred to as SKI. This material is said to contain 90% of 1-4 members (70% *cis* and 20% *trans*), 2% 1-2, and 7% 3-4 members. The structure and properties are held to approach those of natural rubber, the respective values for unfilled SKI and natural rubber being given as:

	SKI	Natural Rubber
Tensile strength, kg/cm²	270	300
Vitrification temperature °C	—68	—70
Elongation, %	1200	850
Residual elongation, %	14	12
Elasticity, %	66	67

The chain structure of SKI, however, is less uniform than that of natural rubber, which is reflected in poorer crystallizability as well as in marked falling off of properties at elevated temperatures. SKI also shows other technological differences, due to the structural peculiarities of synthetic rubbers, chief among which is insufficient tackiness.

From another source, it appears that tires and tubes have been experimentally made from SKI and gave satisfactory results in tests.

[1] *Plaste u. Kautschuk*, Aug., 1957, p. 301.

Germany

Petrochemicals Use Up

Recent announcements reflect the growing interest being shown by leading chemical and oil companies in petrochemicals in Germany. Esso A.G., Hamburg, plans to set up a 60,000,000 DM. plant in Cologne for large-scale production of petrochemical materials. It is expected that the plant will be in production about 1959, at the same time as the Esso refinery, now under construction. The plan is to convert benzene fractions into gaseous olefins at very high temperatures by a process hitherto not used on a large scale in Germany. The olefins, conveyed by pipeline, will serve as bases for synthetic fibers, plastics, soaps, solvents, synthetic rubbers.

It is also learned that Farbenfabriken Bayer A.G. and B. P. Benzine u. Petroleum Gesellschaft will produce petrochemicals in a joint venture that will require the investment of 240,000,000 DM. It is understood that the two concerns will participate equally in this scheme. Plant will probably be erected near the Dormagen works of the Bayer company. Oil-cracking installations, which will produce basic material for organo-chemical products, are to be supplied annually with 300,000 tons of petroleum products by a new oil refinery in the Rhine-Ruhr area.

Supersonic Tire Testing

Phoenix Gummiwerke A.G., has applied for patent for a newly developed supersonic tire test based on the echo principle. The method is being used by the firm in tire development and in periodical control of production.

Indonesia

CD Crepe for Wire

To stem the advance of the use in cable insulations of plastics, which threaten to oust natural rubber completely and permanently from this field, efforts at the BP&PK Experimental Station (formerly INIRO), Java, have for some time been directed toward development of a rubber with low protein and ash content, which could be put on the market at a reasonable price. This result seems to have been attained by inducing the fermentative decomposition of the albumens in natural rubber coagulum by keeping it under water for definite periods; the decomposition products are removed by dialysis in running water, and the resulting product worked up as crepe. This coagulum dialyzed crepe, or CD crepe, as it is called, has the appearance of a good crepe, although it tends to show dark stripes caused by local bacterial discoloration. This crepe can be prepared by any crepe factory disposing over enough water and tanks for dialysis.

About 1956, samples of CD crepe were sent to rubber manufacturers overseas, and apparently they met with some approval. In the United States, acceptance of the crepe seems to be contingent on a better appearance; recently a European cable manufacturer inquired as to the possibility of obtaining at least 50 tons of the material.

Hitherto estates in Indonesia have been reluctant to undertake the preparation of CD rubber, and only a few are producing it experimentally. The reasons for this attitude are: the local price for normal crepe has been above the world market price; and costs of production are higher, mainly because CD crepe takes one month to prepare against five days for normal crepe. With the definite demand from an important European cable factory, however, and the decrease in the price differential that has meanwhile taken place, it is hoped that local estates will take up this new crepe which seems to offer such promise of recapturing for natural rubber at least part of the market for cable insulations. As far as is known, CD crepe or a similar product is not yet being produced on a commercial scale in or outside Indonesia.

Yield Stimulants Safe

To discover whether the use of stimulants to increase the flow of latex affects aging qualities of natural rubber, tests were carried out at the Central Association of Experimental Stations (C.P.V.) at Bogor, Java. For these tests, all samples of sheet were first homogenized by the same method, and the plasticity determined by a Mooney viscometer. Then the sheet was heated in a special way, and plasticity again determined. The decrease in Mooney viscosity was used as a measure to indicate whether or not oxidative activators, including sulfate of copper, were present in amounts sufficient to lower stability to aging of the rubber. With the aging methods employed, it was found that when the Mooney viscosity was reduced by not more than 30 units, there was no indication that resistance to aging was lowered.

The samples included sheet prepared from latex obtained from trees one week *before* trees were treated with stimulant, and from one day to 4½ months *after* treatment; a variety of stimulants was used. None of the samples showed a reduction of Mooney viscosity of more than 30 units; variations in viscosity of sheet from treated trees were in good agreement with those from sheet from the untreated, control trees; there was no increase in copper content of rubber from treated trees. It is therefore concluded that the use of the flow stimulants investigated has no adverse effect on the aging of the rubber.

U. S. Firm to Buy Estate?

Anglo-Indonesian Plantations, Ltd., a British owned company producing rubber, tea, and sisal in Java, has announced that an American firm proposes buying up its £3,274,000 capital. It seems likely that if a firm offer is received on the basis of 6s. each for the 3,000,000 ordinary £1 stock, and par for the unsecured convertible notes, involving a total price of £1,000,000, stockholders will be advised to accept. The company booked a net loss of £35,664 for 1956, against a profit of £14,598 for 1955.

Italy

1956 Output Down

After a banner production year in 1955, activity in the Italian rubber industry slowed down in 1956; indeed, in the case of automobile and bicycle tires, footwear, heels and soles, production fell below the 1954 level, and total 1956 figures for the industry as a whole might have been under those for 1954, if the sustained increase in mechanical goods had not more than made up for the decline in other branches. The following table (in tons) shows the results for 1954, 1955, and 1956 as compared with those for 1950.

Exports and imports showed a mixed trend—automobile tires exports decreased from 18,827 tons in 1955 to 17,394 tons last year; while the other important export item, rubber footwear, increased from 108,654 to 137,896 pairs, respectively. On the other hand, tire imports rose from 3,963 to 4,238 tons, and footwear from 94,851 to 100,921 pairs. Total consumption of rubber in 1956 is estimated to have dropped to 65,000 tons from 70,000 tons.

The use of synthetic rubber, growing steadily in Italy, in 1955 came to 13,000 tons, compared with 10,000 tons in 1954 and 3,000 tons in 1950. Synthetic rubber figures for 1956 have not yet become available.

France

SBR Plant Planned; Use of Army Rubber Footwear Out?

Société Nationale des Petroles d'Aquitaine, Lacq, (Southern France) is reported to have an understanding with the Firestone Tire & Rubber Co., Akron, O., U.S.A., for jointly establishing a plant to produce 40,000 tons of styrene-butadiene rubber annually. The French company would supply 85,000 tons of butane annually for the undertaking; it is calculated that this amount of butane would yield 57,000 tons of n-butane, from which 30,000 tons of butadiene could be obtained.

Firestone, it is said, will provide credit of 22 billion francs for a SBR installation in the neighborhood of Lacq, most of the equipment to come from America. Extensive automation is expected to keep manpower requirements down to not more than 200 persons for this plant.

A stir has been created among French footwear manufacturers by a resolution adopted by the Assemblée Nationale, on April 12, 1957, to the effect that since rubber is an imported product and that the impermeability to air of rubber soles makes them prejudicial to the hygiene of the troops, the use of rubber soles by the army is neither in the interest of the economy of the country nor of national defense; consequently the government should be asked to reconsider immediately a decision to replace leather by rubber soles for army footwear.

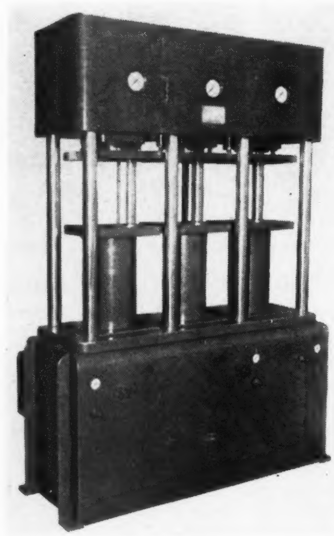
The French Rubber Manufacturers' Association has set about refuting the statements. It showed that rubber workers earn 48% more than leather workers. FRMA also pointed out that over against an increase of 45% in the value of rubber imports for the footwear industry during the six-year period 1950-1956 must be put an increase in the value of footwear exports amounting to 420% in the same period.

(*Continued on page 316*)

	1950	1954	1955	1956
Automobile tires	41,718	69,119	74,786	68,139
Tubes	3,100	4,906	5,298	4,898
Cycle tires	4,908	5,216	5,307	4,424
Tubes	1,049	966	1,025	849
Footwear	5,764	6,551	6,450	5,879
Mechanical goods	17,235	32,201	37,226	38,510
Sanitary goods	663	1,129	926	1,068
Heels and Soles	2,387	2,858	2,407	2,157
	76,824	122,946	133,425	125,924

NEW EQUIPMENT

Multiple Molding Presses



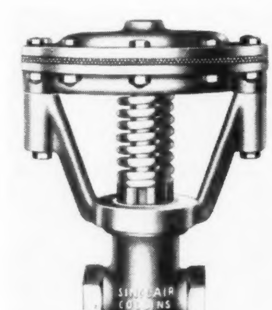
Allied Engineering's multiple molding press

Multiple molding presses for rubber, plastic, or ceramic materials have been announced by the Allied Engineering & Production Corp., Alameda, Calif. Two to four presses occupy a common pedestal base which houses the controls, but each station has its own controls so that it may be operated independently. Initial cost is less since adjacent stations have common columns.

Each section has a capacity of 50 tons, and maximum operating pressure for each is 5,000 psi. Power is obtained from the shop air line. Temperature range of the 13- by 13-inch platens is 150 to 550° F., and ram strokes and daylight openings are 13 inches. The multiple stations provide for staggered curing cycles, thus using a single operator's time to the best advantage.

Various modifications are offered by Allied, such as capacities up to 250 tons, several sizes of ram diameter, water cooled platens, higher temperature ranges, etc.

Sinclair-Collins Valves



Sinclair-Collins control valve, with ductile iron body, for 600 psi., 350° F. hot-water service

A full line of diaphragm-operated control valves, with ductile iron bodies for use with high-pressure, high-temperature hot water, has been announced by Sinclair-Collins Valve Co., Akron, O.

Designed for control of rubber molding and similar equipment, S-C ductile iron valves are suitable for hot-water service at pressures up to 600 psi, and temperatures as high as 350° F. The ductile iron used in the bodies of these valves is reputed to be much more corrosion-resistant than steel and has a tensile strength approximately three times that of bronze. Hardened stainless steel stem and replaceable seat inserts assure long, leak-free service, it is further claimed.

Skirted seat rings are said to resist wire drawing. Complete interchangeability of parts simplifies field maintenance. Union nut, which retains lower seat, is easily removed for quick inspection of valve seats, the manufacturer also states.

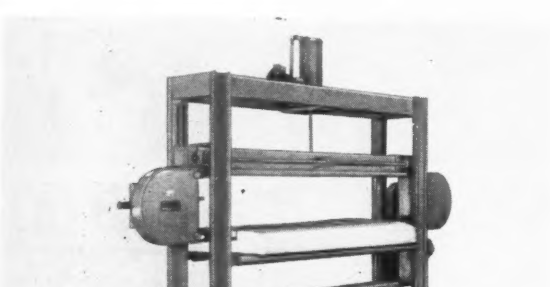
Sinclair-Collins 600-pound ductile iron valves are offered in two-way, three-way normally open or normally closed and reverse acting types. Sizes range from ½- to 1½-inch NPT. Top diaphragm, actuated by 20 to 30 psi. air, can be operated by a S-C cycle controller, any applicable pneumatic or electro-pneumatic cycle control device, or manually.

Lesto GEQI—electric rubber cutter

New Electric Rubber Cutter

Victor J. Krieg, Inc., New York, N. Y., sole U. S. representative for Scintilla, S. A., Solothurn, Switzerland, is now importing a new type of rubber cutter. The Lesto, electric rubber cutter, Model GEQ1, is especially designed for cutting rubber, felt, soft leather, plastics, and similar materials in any desired shape. Materials up to one inch thick can be cut with the standard blade, and up to 3/8-inch thick with a piercing knife. Also available is a circular cutting attachment for circles up to 24 inches in diameter.

The Lesto GEQ1 is powered by a sturdy, highly efficient electric motor which runs on both direct and alternating current.



Femco's automatic cut-off machine

Automatic Cut-Off Machine

A machine which automatically cuts urethane foam into blocks of predetermined length and handles stock up to 80 inches wide and 18 inches thick is now available from Falls Engineering & Machine Co., Cuyahoga Falls, O. Femco's automatic cut-off machine fits existing conveyor systems. As the

(*Continued on page 300*)

NEW MATERIALS

Circosol NS—Oil Extender

A pale, non-volatile naphthenic-type oil, specifically developed for use as an oil extender in the manufacture of extremely light-colored styrene-butadiene polymers, has recently been announced by Sun Oil Co., Philadelphia, Pa. New Circosol NS combines excellent non-staining and color stability in the finished rubber product with the good overall processing qualities associated with naphthenic oils. It can be used to extend SBR polymers 1703, 1707, 1708 for light-colored mechanical goods, toys, belting, floor tile, shoe soles, coded wire insulation, white side-walls, and automotive trim.

Typical properties of new Circosol NS are reported as follows:

Viscosity, SUS at 100° F.	781
210° F.	61
API gravity	21.0
Specific gravity, 60° F.	0.9279
Flash point, °F.	395
Fire point, °F.	445
Aniline point, °F.	179
Pour point, °F.	−5
Molecular weight	380
Color, ASTM	2¼
Billing weight, lb./gal.	7,660

Circosol NS is recommended where minimum staining and minimum color migration are important to the end-use of the finished rubber product.

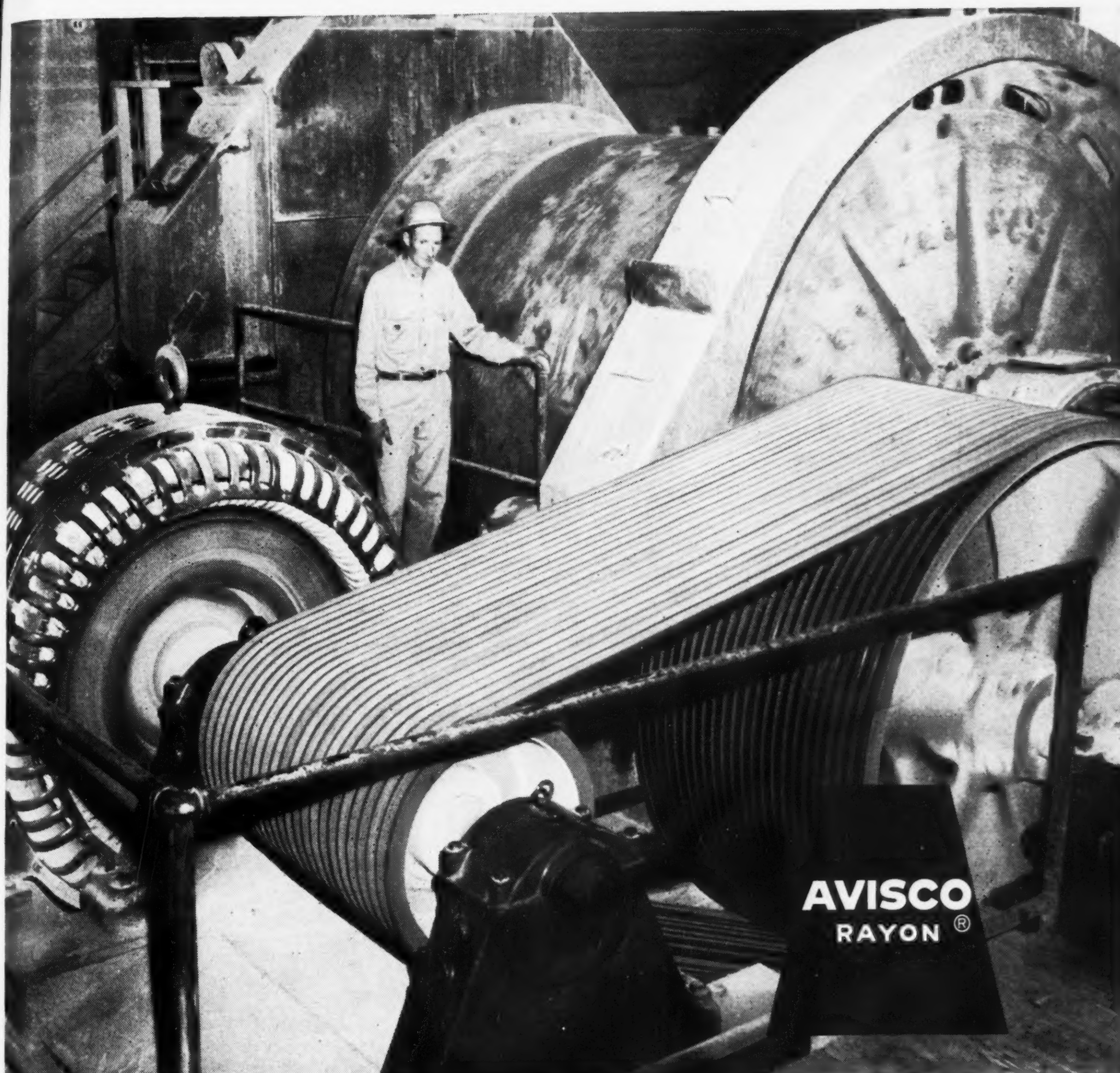
Unique Eastman 910 Adhesive

The research laboratories of Tennessee Eastman Co., division of Eastman Kodak Co., in Kingsport, Tenn., have developed a new liquid adhesive so unique in its combination of rapid set-time and high strength that it promises to have widespread influence on industrial design, it is said. The high strength bond is accomplished without the necessity of heat, pressure, evaporation of solvent, or long curing times. Resulting from the polymerization of a cyanoacrylate monomer, the adhesive action works well with a wide variety of materials including metals, glass, wood, ceramics, rubber, plastics, cork, felt, leather, cardboard, porcelain, and even human skin.

Some properties of Eastman 910 Adhesive are as follows:

Pure cyanoacrylate monomer	
Appearance	clear, colorless liquid
Boiling point at 2.5-2.7 mm.	48–49° C.
Viscosity at 25° C. (Brookfield)	2.2 cps.
Heat of polymerization in water	10.05 ± 0.2 kg.-cal. per mole
Commercial grade Eastman 910 Adhesive	
Appearance	cloudy, colorless liquid
Viscosity at 25° C. (Brookfield)	approximately 100 cps.
Density	1.11 g. per cc. or 9.25 lbs. per gal.
Flash point and fire point (Cleveland open cup)	180° F.
Solubility	Soluble in nitromethane
Cured adhesive bond	
Softening point	165° C.
Solubility	Soluble in N,N-dimethylformamide
Index of refraction	Approximately same as glass
Dielectric constant at 1 mc. (ASTM D 924–49)	3.34
Dissipation factor at 1 mc., % (ASTM D 924–49)	2.02

A technical data report, TDR # R-101, is available from the company.


AVISCO
RAYON ®

New Polysulfide Liquid Polymer

Thiokol Chemical Corp., Trenton, N. J., has developed a new polysulfide liquid polymer, LP-205, particularly for improved low-temperature properties with a service range of from –95 to 250° F. The polymer segments are composed of hydrocarbon groups joined by alternating formal and disulfide links. The chains of this type are terminated by mercaptan groups.

Some typical physical properties of LP-205 follow:

Color	clear, amber
Specific gravity @ 20/25° C	1.130
Viscosity @ 25° C, centipoise	1200–1700
Moisture content	0.1% max.
pH (water extract)	6.0–8.0
Average molecular weight	1200
Stability	over two years

A technical bulletin, "LP-205 Liquid Polymer," is available from the company.

Bunac D-74 Rubber Activator

A new secondary accelerator for synthetic and natural rubber formulations is being made available by the industrial chemicals division of Olin Mathieson Chemical Corp., Baltimore, Md. Called Bunac D-74 rubber activator, it is said to supplement such primary accelerators as diphenylguanidine, Santocure, and Captax. According to the company, Bunac D-74 is particularly useful in compounding SBR, although it may also be incorporated to advantage in other synthetic rubbers and in natural rubber.

In SBR tire tread formulae, this activator both produces a tread stock with a wide curing range, thus tending to minimize possibilities of undercuring and overcuring, and improves resistance to cracking under repeated flexing. Compositions containing Bunac D-74 yield vulcanized products of improved cut-growth resistance without causing higher heat build-up under repeated flexing, Olin Mathieson reports. In natural rubber formulation, such as tire carcass stocks, Bunac D-74 is said to be valuable as a tackifying plasticizer as well as secondary accelerator.

The dark, mobile liquid is added to the rubber mixes by the usual compounding methods. It may be incorporated in the gum matrix on a two-roll mill or in a Banbury mixer. It is also possible to disperse the activator in the liquid rubber latex and then coagulate the latex, or to mix it with carbon black and other solids and incorporate the blended materials into the rubber compound. Bunac D-74 rubber activator is available in 55-gallon drums and tank cars.

Peptizers 620 and 640

Two new rubber peptizing agents have been introduced by Pitt-Consol Chemical Co., Newark, N. J. These products, Peptizer 620 and Peptizer 640, are presently available in limited quantities for laboratories and on-the-job evaluations. Commercial quantities will soon be made available. Both of these peptizers have been successfully evaluated in natural and synthetic rubbers. Substantial reductions in Mooney viscosity at low concentration and ordinary milling temperatures are obtained. No adverse effects upon the compound or cure properties, the rate of cure, or the age resistance of the treated rubber have been observed. Specifications and performance data are available from the company.

Some specifications for the peptizers are as follows:

	Peptizer 620	Peptizer 640
Specific gravity	0.900	0.895
Thiol content, minimum	40%*	40%†

* Thiocresols.
† Thioxylenols.

Both materials are liquids, with the non-thiol component being an inert hydrocarbon. Use of 0.1- to 0.4-part phr, depending on processing conditions and desired plasticity, is recommended.

SRS-55 Anionic Stabilizer

SRS-55, produced by Seaboard Chemicals, Inc., Salem, Mass., is a versatile stabilizer finding wide use as a surfactant in the emulsion polymerization of monomers, and as a mechanical stabilizer and anti-coagulant in the post-stabilization of a wide variety of compounded natural and synthetic latices. It is claimed to have the following advantages: highly efficient even in small quantities; low foaming; anionic; infinitely dilutable with water without gelation; lightfast; and economical to use on cost basis.

SRS-55 is suggested for use in the production of practically all the polymer latex systems, and in the copolymerization of ethyl acrylate with such monomers as allyl maleate, allyl phthalate, crotyl acrylate, cinnamyl acrylate, piperylene, vinyl cyclohexane, 2-chlorobutadiene, 2-methyl pentadiene, styrene divinylbenzene, cyclopentadiene, etc.

Typical physical properties have been reported as follows:

Form	free-flowing liquid
Solids	35%
Color	light straw
Odor	bland, fatty
Ionic charge in water	anionic
pH of 10% solution in water	7.8
Weight/gallon	8.41 lbs.
Storage stability	indefinite

A technical bulletin on SRS-55 is available from the company.

Oil-Treated Crystex Insoluble Sulfur

Stauffer Chemical Co. recently completed construction of a major new unit at its Monongahela, Pa., plant for the manufacture of a unique type of insoluble sulfur. The unit yields an oil-treated formulation of insoluble sulfur, being marketed under the Crystex trade name, as a special grade at no price premium.

The typical analysis of this 20% oil-treated Crystex is generally comparable to regular Crystex in stability, mesh size, % ash, and % acidity. The important typical analysis figures are:

Oil content	20% (±1%)
Insoluble sulfur	68.0% (±0.8%)
Total sulfur	80% (±1%)

While the benefits of supplying a pre-oiled insoluble sulfur are not new ideas, various types of oils at different percentages were investigated. Twenty per cent was found to be the most desirable oil content to obtain a dry mix—no oil bleeding—and at the same time maintain the quality properties of Crystex. The medium process oil used has the following particulars:

Saybolt viscosity	105 secs @ 100° F., using a universal orifice
Specific gravity	0.89 to 0.93
Source	naphthenic base

Regular Crystex, before oil-treatment, is a commercially pure (99.5%) sulfur which contains 85% min. insoluble sulfur, which is insoluble in all known solvents, and in appearance is a fine, bright-yellow powder. Crystex 85% insoluble sulfur does not have a definite melting point, but softens appreciably at 70° C. and is a very viscous fluid at 90° C.

Reported properties of Stauffer Crystex are as follows:

Chemical specifications:

Insoluble sulfur	85.0% min.	(by weight)
Elemental sulfur	99.5% min.	(by weight)
Acidity as H_2SO_4	0.15% max.	(by weight)
Ash	0.15% max.	(by weight)
Heating loss	0.25% max.	(by weight)

Fineness, wet screen, U. S. standard:

100% through 80 mesh, 99.5% min. through 100 mesh

Physical properties:

Specific gravity	1.95
Bulk density	43–50 pounds per cu. ft.
Oil absorption	70–95 mls. per 100 gms.
Specific surface	10,000 sq. cm. per gm.
Surface	2.5–3.0 microns, ave. diameter

ASRC offers you highest quality synthetic rubber . . . efficient service that is timed to your needs . . . personal attention to your orders . . . prompt shipments. You will find it pays to rely on ASRC for *quality* products and *quality* service.

CURRENT POLYMERS

COLD	CLASS	HOT	CLASS
ASRC 1500	Staining	ASRC 1000	Staining
ASRC 1502	Non-Staining	ASRC 1001	Slightly Staining
ASRC 1503	Non-Staining	ASRC 1004	Staining
ASRC 3110	Non-Staining	ASRC 1006	Non-Staining
COLD OIL		ASRC 1009	Non-Staining
ASRC 1703	Non-Staining	ASRC 1018	Non-Staining
ASRC 1708	Non-Staining	ASRC 1019	Non-Staining

ASRC

AMERICAN SYNTHETIC RUBBER CORP.

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Silastic 2084 Masterbatch

Silastic Catalyst 2084 is a masterbatch containing 20% ditertiary butyl peroxide mixed with Silastic gum and inert filler. It is an effective vulcanizing agent for vinyl-containing silicone rubbers and has the advantages over 100% peroxide of reduced fire hazard and easy handling, with addition of a minimum of diluent to the rubber.

In addition, the 2084 masterbatch reduces the time necessary to cure thick sections, minimizes the surface discoloration of molded parts, reduces backrinding, and produces stocks with lower compression set and the same degree of vulcanization over a wide range of concentrations.

Silastic Catalyst 2084 can be used only with silicone rubber containing vinyl groups, however, and is not suitable for hot-air vulcanizing. Press temperatures of at least 330° F. must be used. Concentrations of from 3% to 5% of the 2084 masterbatch are recommended.

The masterbatch is grey-white in color and is in paste form. It has a specific gravity of 1.1 and is supplied in one-, 10-, and 50-pound containers.

A technical bulletin on the material is available from Dow Corning Corp., Midland, Mich.

Diborane

The commercial availability of diborane (B_2H_6) has been announced by Callery Chemical Co., Pittsburgh, Pa. The compound can be used as an intermediate, a reducing agent, a catalyst, and a flame speed accelerator. Some of its applications include the polymerization of ethylenically unsaturated compounds such as methyl methacrylate, vinyl acetate, chlorotrifluoroethylene, and butadiene wherein diborane serves as a catalyst; the acceleration of cure for silicone and other synthetic rubbers; the use of diborane as welding flux and to raise welding flame temperatures; the purification of alkyl borohydrides; and the formation of trialkyl boranes.

Some physical properties of diborane are as follows:

Colorless gas at normal atmospheric conditions.
Liquid between —165 and —92.5° C.
Density is 0.333 g./ml. at 243.6° K. to 0.210 at 288.2° K.
Viscosity is $(65.7—0.227\ T)d^{2/3}$ dynes/cm.^{2}
Net heat of combustion is 481.9 Kcal./mole at 298.16° K.

Callery's Technical Bulletin C-020 on diborane gives many details of properties and chemical reactions, including those with ammonia, amines, phosphines, ethers, carbonyl compounds, hydrocarbons, metal alkyls, metal hydrides, sodium, and miscellaneous compounds. Also included are data on storage, handling, and safety measures.

Urethane Adhesive AV24600

A newly developed adhesive, AV24600, for laminating and combining urethane foam to many types of surfaces has been announced by Compo Chemical Co., Inc., Waltham, Mass. This material is readily applied by conventional methods and is adapted for heat or pressure-sensitive sealing. It is claimed to impart immediate high strength, excellent adhesion, and flexibility, while being resistant to water, mold, fungus, and weathering. The resulting bonds permit full machining operation.

AV24600 is a general-purpose adhesive for adhering urethane foam to other foams, wood, fabrics, metals, and many other materials used in the fabrication of urethane foam into manufactured products. Suggested uses are: upholstering, sound conditioning, carpet underlay, clothing lining, household aids, packaging, toys, and shock absorbers.

Some of the specifications of AV24600 are as follows:

Color	tan
Base	synthetic rubber
Vehicle	naphtha blend
Total solids	22%
Lb./gal.	7.49
Specific gravity	.90

Good-rite 2057

B. F. Goodrich Chemical Co., Akron, O., has introduced a new product, Good-rite 2057, a ready-to-use, equally proportioned masterbatch of Good-rite 2007 high styrene resin and cold, non-staining SBR. Owing to its unique "popcorn" form, the dustless, free-flowing material may be processed as received.

When Good-rite 2057 is compounded with SBR, the vulcanizates exhibit a very complete range of physical properties including good hardness, low specific gravities, improved abrasion and flex characteristics, and good tear and electrical properties. Suggested applications for Good-rite 2057 include shoe soles, floor tiling, and hard extruded items.

Some properties of Good-rite 2057 are as follows:

Specific gravity, 25° C.	0.99
Ash, %	1.0
Soap, %	0.1
Heat loss	0.2
Organic acid, %	5.0

Technical data and typical recipes for Good-rite 2057 are available from the company.

Plastolein 9078 LT Plasticizer

A new, relatively low-cost, low-temperature plasticizer for vinyls, Plastolein 9078 LT Plasticizer, has been announced by the organic chemical sales department of Emery Industries, Inc. The compound is designed to meet the need of a low-temperature plasticizer in the adipate price range. This material is said to possess higher efficiency and substantially greater compatibility than adipates. In addition, it imparts higher tensile strength at efficiency concentration, lower oil extraction, and appreciably lower volatility.

Data on Plastolein 9078 LT Plasticizer include:

Geon 101	100
Low-temperature plasticizer	48
DOP	—
Cd-Ba stabilizer	3
Tensile, psi.	2850
Elongation, %	365
Modulus, 100%, psi.	1130
Hardness, D. 10 sec.	85
Volatility, SPI, 70° C.	
1 day—% loss	0.9
7 days—% loss	4.0
Masland impact—failure @ °C.	−40
Heat stability @ 350° C., min.	90
Extraction, % loss	
Water, 24 hrs. @ 50° C.	0.1
Soapy water, 24 hrs. @ 50° C.	0.5
Mineral oil, 24 hrs. @ 25° C.	5.5
Compatibility, roll spew	slight

A technical bulletin, No. 401, Plastolein 9078 LT Plasticizer, is available free upon request to Emery Industries, Inc., Cincinnati, O.

Automatic Cut-Off Machine

(Continued from page 296)

urethane foam is poured continuously, the stock is automatically cut into blocks. Lengths six to sixty feet may be cut, depending upon the gear rate.

Length of the material moving under the cutting blade of the machine is measured by feet and inches on a metering device. Then, when the stock reaches the preset length, a saw starts a vertical cut and moves lengthwise of the material at conveyor speed. After the cut is made, the saw moves back to its original position. The cutting blade is at a 90-degree angle, and the saw makes a true vertical cut. Because of the way the blade is set, it removes a slight amount of the material as it makes the cut.

Further information on the cutter may be obtained from the company.

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NEW PRODUCTS

Improved Truck Tire

Goodyear's Hi-Miler Cross Rib

A new truck tire, called the Hi-Miler Cross Rib, is being marketed by The Goodyear Tire & Rubber Co., Akron, Ohio, for prime use in over-the-road trucking operations. Considered a revolutionary Goodyear truck tire design, the Cross Rib features a 60% deeper tread; advantage: provides greater original tread mileage, particularly in drive wheel usage; angled traction bars crosswise to the tread; advantage: gives increased traction in all directions; submerged circumferential ribs to buttress the shoulders; advantage: reduces scuffing action and uneven wear; wide, open grooves; advantage: resists stone holding.

Now being produced in quantity at Goodyear plants in Topeka, Los Angeles, and Akron, the Cross Rib is available in tubeless and tube-type construction, with carcass of 3-T nylon cord. Sizes range from 8.25-20, 10-ply, through 11.00-24, 12-ply, tube-type; and 9-22.5, 10-ply, through 12-24.5, 12-ply, tubeless.

Silent Traction Tire

The Dunlop Tire & Rubber Corp., Buffalo, N. Y., has announced production of an improved Silent Traction passenger-car tire that provides smooth, steady traction in mud, snow, and slush. The tire, Dunlop officials said, also runs quietly on dry pavement, with no annoying drone or vibration.

Features of the tire are newly designed sipes which add thousands of gripping edges to Dunlop's exclusive Silent Traction tread pattern. Under starting and stopping traction the sipes open up to provide hundreds of additional gripping edges. This action spreads both riding ribs and traction blocks over greater contact area and minimizes the danger of wheel-spin, side slip, and skidding.

Dunlop's Silent Traction

The tire is available in 14-, 15-, and 16-inch sizes in tubeless or tubed, white sidewall or black.

New U. S. Royal Master Tire

U.S. Royal Master

A passenger-car tire strong enough to make aircraft landings at 140 miles per hour with seven times the weight normally carried by an automobile has been introduced by United States Rubber Co., New York, N. Y. This new U. S. Royal Master has design features of aircraft tires. It was developed to provide a margin of safety well beyond the demands on tire strength made by today's heavy, powerful cars equipped with power brakes and steering.

The new Royal Master is made with double denier nylon cord with a tensile strength of 52 pounds, compared to 29 pounds for standard nylon tire cord. The burst strength of the tire is more than 20 times the normal inflation pressure of 24 pounds. The load-bearing body cords are insulated with an extra-heavy rubber compound of the same basic stock as aircraft tires. This gives the tire great shock-absorbing capacity and keeps the cords from chafing against each other.

Mileage tests showed 37% greater mileage for the new tire over the average mileage for other premium tires on the market. The Royal Master is said to wear 18% longer than the best of the other tires tested.

New Velon Filament

A new Velon yarn, a low-pressure or linear polyethylene monofilament, recently was announced by the Firestone Plastics Co., Pottstown, Pa. This new product is especially suitable for webbing for outdoor furniture, and broad fabrics for casual upholstery and automobile seat covers. Velon LP is especially high in tensile and knot strength. Its abrasion and moisture resistance, as well as its flex life, are said to be superior to those of other monofilaments used for such purposes. Color stability is good, and, in fact, some colors have withstood as many as 800 to 1,500 fadeometer hours with no sign of change, the manufacturer further claims.

Goodrich High-Speed Tubeless Tire

A new high-speed tubeless passenger tire that is said to provide maximum safety at top turnpike speeds and yet to give long wear at regular speeds has been introduced by the B. F. Goodrich Tire Co., Akron, O. The new tire, named "Silvertown 125," has six nylon cord plies, two more than in the conventional passenger tire. It is claimed that the nylon-cord construction resists some of the main causes of tire failure, such as road shock and heat build-up in tires run at high speeds.

Six-ply "Super-V" cord angle construction prevents formation of shock or standing wave before a relatively high speed has been reached. Shock or standing wave is a dangerous twisting or distorting of the tread which sets up at some speed in every tire.

The tread of the "125" has the same tread depth found in standard tires instead of the higher tread of racing tires. This feature is said to enable the "125" to deliver the same mileage and wear in normal driving that motorists get from regular tires.

The cord body of the new tire is protected from the danger of severe impact by a patented butyl inner liner.

TECHNICAL BOOKS

BOOK REVIEWS

"The Science of Engineering Materials." Edited by J. E. Goldman. John Wiley & Sons, Inc., New York, N. Y., 1957. Cloth cover, 6½ by 9¼ inches, 542 pages. Price, $12.00.

This book is "a series of lectures on the impact of solid state science on engineering materials, based on the proceedings of the Carnegie Conference held at Carnegie Institute of Technology in June, 1954, sponsored jointly by the American Society for Engineering Education, The National Science Foundation, the University of Illinois, and the Carnegie Institute of Technology."

Modern engineering science is rapidly turning away from the study of the "macroscopic" phase of its subject and is looking toward the "microscopic" or "molecular" phases of matter for the solution of its problems. Formerly engineers used to be content to take a newly discovered material and study its properties to see where it could best be used in the solution of engineering problems. Today the trend is to design and produce a new material to solve a specific problem at hand. Solid-state science is the generator of many of the theories and techniques that make this sort of thing possible. The purpose of this book is to serve as an outline or guide for the introduction of solid-state science into the engineering curriculum.

The book is divided into six parts as follows: "Part I. The Structure of Matter"; "Part II. Metals and Alloys"; "Part III. Surfaces"; "Part IV. Magnetism and Magnetic Properties"; "Part V. Semiconductors and Dielectrics"; "Part VI. Non-crystalline Materials." There is a total of 18 chapters (or lectures).

In general, this book makes interesting reading for the practicing engineer or applied scientist who wants to get a modern overall view of the field of engineering materials or who may wish to learn some of the more sophisticated concepts in his own particular specialty.

The sections likely to be most familiar and of most interest to chemists, chemical engineers, and rubber technologists are: Chapter 11, "Surface Phenomena"; Chapter 16, "Some Aspects of the Physics and Chemistry of Cement"; and Chapter 17, "Molecular Structure and Mechanical Behavior of High Polymers."

Chapter 11 is a general discussion of such topics as, friction and adhesion (the problem of rubber tack is not discussed), adsorption and catalysis, corrosion, oxidation of metals, and electronic emission. The use of adsorption studies to measure surface areas is not mentioned here, but is briefly noted in Chapter 16.

Chapter 17, written by Turner Alfrey, Jr., is essentially an abstraction from his book "Mechanical Behavior of High Polymers." Although the "tailoring" of new polymer structures with desired physical properties is mentioned, there is no note made of the recently discovered process for producing isotactic polymers.

In order to read this book with understanding one must have attained a considerable degree of scientific maturity.

"Friction and Lubrication." By F. P. Bowden and D. Tabor. John Wiley & Sons, Inc., New York, N. Y. 1957. Cloth cover, 4¼ by $6\frac{3}{16}$ inches, 150 pages. Price $2.25.

This book is another in the popular and authoritative Monographs on Physical Subjects published by Methuen & Co., Ltd. in England and by Wiley in the United States. The authors, Bowden and Tabor, published a larger book, "The Friction and Lubrication of Solids," in 1950 (revised reprint, 1954) as an International Monograph in Physics by the Clarendon Press of Oxford.

The first chapter of the present book is a short, but interesting historical introduction to the subjects of friction and lubrica-

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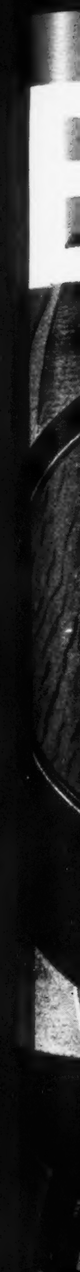

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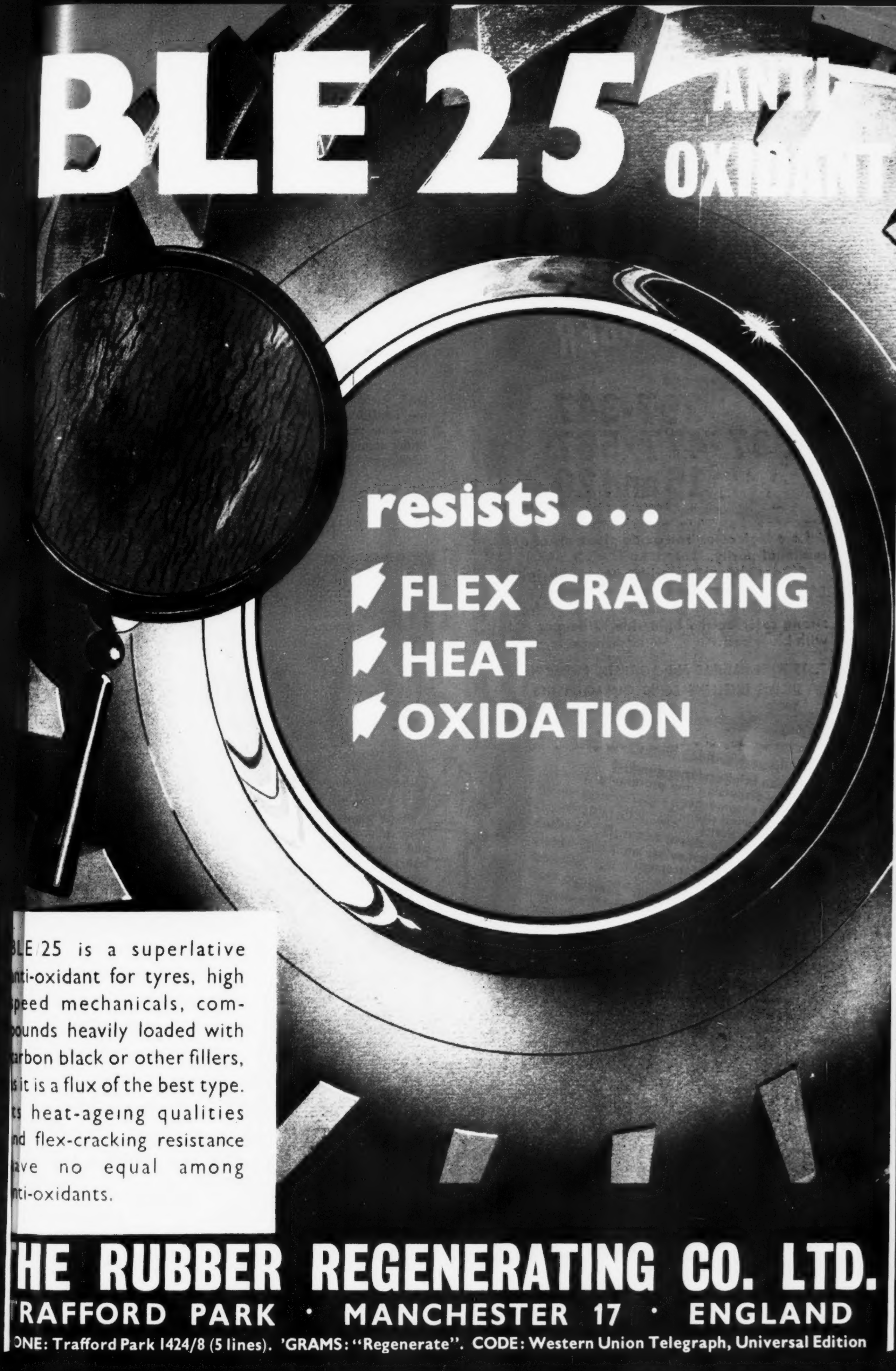
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tion that runs all the way from the musings of Leonardo da Vinci to the present. Chapter 2 is concerned with the nature of solid surfaces and the real area of contact between them during sliding, a fundamental factor in the investigation of frictional phenomena. The validity of the "classical" laws of friction and discussions of surface damage, and the mechanism of friction are the concern of the following chapter.

Chapter 4 discusses the important role played by surface films on friction and the very large adhesive forces obtained when the films are removed; while the next chapter deals with the surface temperature of sliding solids.

Chapter 6, on the friction of non-metallic solids, covers the frictional behavior of polymeric materials. The friction of rubber is found to depend on the load and the geometry of the surfaces involved.

The second part of the book, beginning with Chapter 8, deals with the behavior of lubricated surfaces, and mention is made of the development of synthetic lubricants made of phthalates, adipates, sebacates, and various silicone oils. Boundary lubrication is the subject of Chapter 9 and 10, and a general discussion of extreme pressure lubricants is given in the concluding Chapter 11.

The book is well written and interesting. Each chapter contains references to more advanced material for additional reading, and there are no involved mathematics to cause difficulties for some readers. The book is designed for those with general rather than the specialized interest in the field of friction and lubrication.

NEW PUBLICATIONS

"2,5-Dihydroxybenzoquinone (DHBQ)." Eastman Chemical Products, Inc., Kingsport, Tenn. 2 pages. Typical properties and reactions of 2,5-dihydroxybenzoquinone are described in a technical data report. Available in pilot-plant quantities the new Eastman derivative of hydroquinone is suggested for investigation as a metal chelating agent, polymerization inhibitor, coupling agent, and tanning agent as well as an intermediate for insecticides, fungicides, polymers, antioxidants, and dyes.

"Lee Truck Tires." Lee Rubber & Tire Corp., Conshohocken, Pa. 16 pages. This new catalog covers the company's complete line of truck tires for on and off the highway use. Included in the booklet are facts about job payload performance and information concerning Lee's exclusive construction features.

"Golf Course Hose." B. F. Goodrich Co., Akron, O. 1 page. This catalog sheet describes recommended uses, the construction and other technical information about the company's golf course hose. Back page of the sheet carries information on the company's professional gardener hose.

"A Guide for Selecting an Engineering Firm." Teller Co., Butler, Pa. 8 pages. Practical advice on the selection of an engineering firm is given in this booklet. Differences among consulting-engineering, construction-engineering, and design-engineering firms are pointed out.

"Properties, Reactions and Uses of Thioglycolic Acid." Evans Chemetics, Inc., New York, N. Y. 20 pages. As the title indicates, the chemical and physical properties, the reactions, and the uses of thioglycolic acid are published in this catalog. In addition to numerous uses, the compound's reactions and effects are described when it is used in polymers, synthetic rubber, plastics, and films.

"Tote System on Handling Bulk Materials." Tote Systems, Inc., Beatrice, Neb. 20 pages. A photographically illustrated, full-color booklet describes the Tote System of bulk materials handling in detail, exhibiting and explaining automatic filling and discharging; describing inter- and intra-plant applications of aluminum Tote bins and Tote tilts, and giving specifications on the construction of the equipment. It also cites special applications of the Tote System, which bridges all industries. A list of users and materials handled is included.

"Plasticizer ODN." #06-73-3-8-57. Harwick Standard Chemical Co., Akron, O. 8 pages. This revised technical bulletin gives physical property data for Plasticizer ODN which include minimum, average, and maximum limits. This material is suggested for use in the compounding of the acrylonitrile copolymers (Butaprene, Chemigum, Hycar, Paracril) and of the various vinyl resins.

"Quad Ring Data." Minnesota Rubber & Gasket Co., Minneapolis, Minn. 12 pages. This reference booklet, illustrated with schematic drawings and specification charts, is intended as a guide for product design and development and in employing the Quad Ring in established applications. The Quad Ring, the unique four-lipped seal with eight sealing surfaces, has found wide use throughout industry by solving design problems of reciprocal, rotary and pressure sealing applications.

"The Story of Diamond Chemicals." Diamond Alkali Co., Cleveland, O. 32 pages. Graphically depicting in word and picture its diverse, growing family of chemical products for industry and agriculture, the company has published the fifth edition of "The Story of Diamond Chemicals—Chemicals You Live By." Highlighting the important contributions of the Company's organic and inorganic chemicals to building a better America through chemical progress, this newly revised and enlarged booklet presents a panoramic picture of these basic materials, their principal applications, and their production, in a style and format which are both interesting and informative to technical and nontechnical readers.

"Geon Resin 121 in Plastisol Compounding." Service Bulletin PR-4. B. F. Goodrich Chemical Co., Cleveland, O. 24 pages. This booklet describes and lists plastisol flow properties, plastisol compounding, computing plastisol formulations, preparing and fusion of plastisols, plastisol applications, and other pertinent information on molding, casting and dipping.

"Stauffer Sulfurs." Stauffer Chemical Co., New York, N. Y. 48 pages. This schematically and photographically illustrated booklet presents a statement about sulfur in general, an explicit statement of the sulfurs sold under the company's label, and an implicit statement about the availability of Stauffer's laboratory and research facilities to any student or manufacturer who would value the company's help on sulfur or related compounds. Statistics, methods of production and refinement, methods of analysis, occurrence and chemical and physical properties of sulfur are given.

"V-Belts. The Machines and Processes of Their Production." S-51106. The Goodyear Tire & Rubber Co., Akron, O. 16 pages. Rubber compounding, preparation of fabric, building steps, curing and finishing are subjects for one-page descriptions of V-belt manufacturing operations.

"Chlorinated Hydrocarbons." Stauffer Chemical Co., New York, N. Y. 20 pages. An illustrated booklet describes properties and uses of five important chlorinated hydrocarbons: perchlorethylene, trichlorethylene, carbon tetrachloride, methylene chloride, and chloroform. The publication contains complete technical data, e.g., typical analyses, solubilities, flash point and density tables and graphs, as well as other pertinent physical and chemical information. One section of the booklet sets forth optimum handling procedures and methods of minimizing waste.

"Paraflint—A Unique New Synthetic Wax." Moore & Munger, New York, N. Y. 4 pages. This illustrated folder presents new technical information concerning the properties of Paraflint[1]-modified polyethylene. Covered are such points as chemical characteristics, uses, and test data. Graphs show melt index, impact and tensile yield strength, permeability, stiffness, brittleness temperature, and congealing point, tensile strength at 40° F., needle penetration, and blocking, scuff, and grease resistance, when combined with paraffin wax.

[1] See our Feb., 1957, issue, p. 770.

"B. F. Goodrich Sheet Packing." B. F. Goodrich Industrial Products Co., Akron, O. 4 pages. A new catalog section that describes the complete line of the company's sheet packing for handling liquids, gases, and abrasives is available without charge. The catalog section illustrates BFG standard sheet packing, describes their uses, and explains in detail how to order. Two pages are devoted to data and specifications.

"Hot Spraying of Hypalon 20 Coatings." R. R. Radcliff and D. J. Kelly. Report BL-330. E. I. du Pont de Nemours & Co., Inc., elastomer chemicals department, Wilmington, Del. 4 pages. This bulletin describes the equipment, procedures, and applications for the hot spraying of Hypalon 20, a synthetic rubber. Application of Hypalon 20 coatings by the hot-spraying method are said to give better drying, increased film thickness per pass and a more uniform film.

"Standard Industrial Chemicals—1958." Barrett Division, Allied Chemical & Dye Corp., New York, N. Y. 16 pages. This brochure supplies data such as description and applications of the company's industrial chemicals, including: tar acids, tar acid oils, phthalic anhydride, maleic anhydride, fumaric acid, phthalonitrile, plasticizers, Cumar resins, Resin S, rubber compounding materials, A-C polyethylene lubricants, naphthalene, tar bases, niacin, acetone, glycols, ethanolamines, aromatic industrial solvents, ethylbenzene, a-methylstyrene monomer, acetophenone, cumylphenol, cumene, anthracene, flotation agents, pickling inhibitors, and tar distillates.

"What's New with Lithium." American Lithium Institute, Inc., Princeton, N. J. 4 pages. In a move designed to meet the growing demand for information on lithium and its compounds, the Institute has commenced publication of this monthly newsletter. It will be mailed to management, technical, and production people in a wide number of industries where lithium has found application or might conceivably be applied in the future. The newsletter will include a review of new developments in the field of lithium as well as a summary of current articles appearing in trade and business publications. To be placed on the mailing list, write to American Lithium Institute, 32 Nassau St., Box 594, Princeton, N. J.

"The Handbook of Powered Industrial Trucks." Industrial Truck Association, Washington, D. C. 96 pages. This complete and authoritative handbook is divided into five sections: industrial truck applications; cost savings through industrial truck handling; planning for and selection of industrial trucks; industrial truck engineering data; and industrial trucks and the future. Copies of the handbook may be obtained from the Association at $5.00 each.

"U. S. Research Reactors." J. W. Chastain, C. R. Tipton, Jr. and D. H Stall. Battelle Memorial Institute, Columbus, O. 73 pages. This booklet contains data and illustrations on more than 30 research reactors in actual operation or under construction in the United States. These reactors are classified according to type: light water moderated (pool and tank types), heavy water moderated, graphite moderated, homogeneous, and reactors for safety research. Copies, at $1.50 each, may be purchased through the Office of Technical Services, United States Department of Commerce, Washington, D. C.

"Plastone." #06-77-4-9-57. Harwick Standard Chemical Co., Akron, O. 4 pages. This technical bulletin covers the company's peptizer and plasticizer known as Plastone, listing various chemical and physical properties, methods of use, laboratory test results, and advantages.

"Naugatuck Plastics—Condensed Catalog." Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 8 pages. This catalog presents a 1957-58 resin guide of the company's Kralastic, Vibrin, and Marvinol resins and resin-rubber compounds. Listed are the available forms of the resins as well as the physical, chemical, and electrical characteristics of their finished parts. Kralastics are resin-rubber compounds (thermoplastic); Vibrins are polyester resins (thermosetting); and Marvinols are polyvinyl chloride resins (thermoplastic).

Publications of Dow Corning Corp., Midland, Mich.:

"Silastic Notebook Contents." 3 pages. This mimeographed sheet replaces contents dated July 1, 1957, bringing data sheets up to Sept 1, 1957.

"Parts Fabricated of Silastic Silicone Rubber." 6 pages. This brochure illustrates and describes applications where silicone rubbers resist compression set, have long life, high strength, withstand weather, ozone, oils, fuels, chemicals, moisture, and steam in a temperature range of —130 to 500° F.

"Dow Corning A-4014 Primer." 4-609a. 1 page. The typical properties, shipping information, and applications are given for Dow Corning A-4014 primer, an air-drying material which improves the band between RTV Silastic and plastic or metal surfaces.

"Silastic 7-171." 9-356a. 1 page. The specifications, typical properties, effect of oven cure time, fabrication, and shipping information are described in this technical data sheet for Silastic 7-171, a 70 durometer, low compression set, silicone rubber stock with excellent dielectric properties.

"Silastic RTV S-5302 and S-5303." 9-378. 1 page. Silastic RTV (room temperature vulcanizing) provides a means of using silicone rubber where high-temperature curing may be impractical. Silastic RTV S-5302 (red) and S-5303 (white) are two different silicone components which, when properly mixed, vulcanize at room temperature to produce a silicone rubber compound. It is an easy-to-apply coating for protecting such components as paper capacitators or transistors which cannot withstand high-temperature curing.

Publications of the British Rubber Producers' Association, Welwyn Garden City, Herts, England.

No. 247. **"Cyclized Rubber."** G. F. Bloomfield and S. C. Stokes. 12 pages. Cyclized rubber is a good reinforcing resin for natural rubber, and its use in masterbatch form greatly simplifies its handling and processing. The masterbatch blends with rubber in all proportions to produce vulcanizates of varying hardnesses. Good tensile properties are obtained with higher moduli than is usual with conventional white reinforcing fillers at given hardness levels. The authors detail the compounding and applications of cyclized rubber.

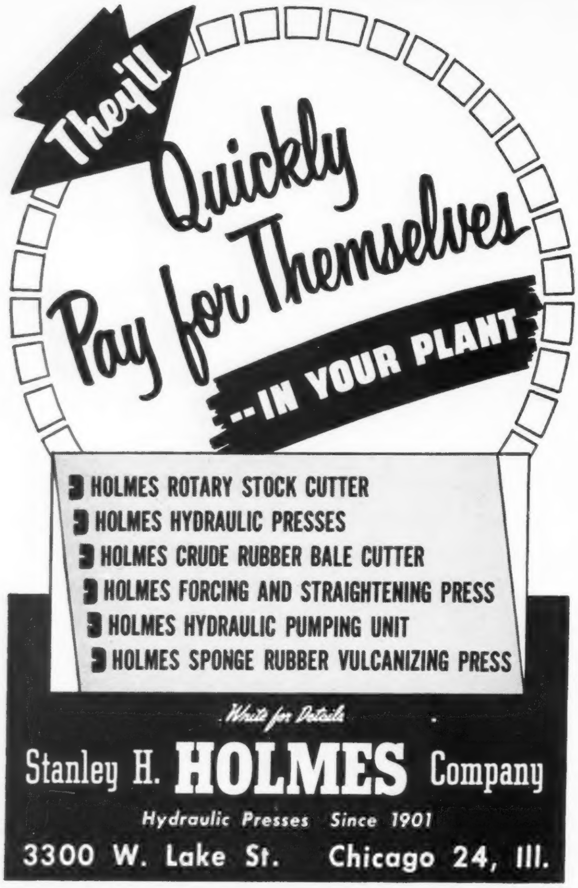
No. 248. **"Rupture of Rubber."** H. W. Greensmith. 12 pages. Part IV of the author's overall paper on the subject, this publication discusses the tear properties of vulcanizates containing carbon black. The tear properties of natural rubber and SBR vulcanizates containing carbon black are compared with those of gum vulcanizates, using a method developed in a previous paper. The distinctive features in the tear behavior of the filled vulcanizates are noted and discussed. The results indicate that there are two types of tear process, which vary in importance according to the tearing conditions, and the influence of carbon black on these processes is described.

No. 250. **"Frictional Temperature Rises on Rubber."** A. Schallamach. 6 pages. Frictional temperature rises and frictional forces on rubber at velocities up to about 400 cm./sec. and under various normal loads were determined by employing a thermojunction as slider. In the experimental velocity range, the frictional temperature rises increase approximately proportional to the square root of the sliding velocity. The finite heat conductivity of the slider was found not to affect the results materially. The temperature rises, when plotted against the dissipated frictional energy, lie on closely grouped curves. Coefficients of friction as function of load and velocity are given.

No. 252. **"Molecular Weight Distribution Functions in Random Reactions of Polymers."** J. Scanlan. 5 pages. A method is given of obtaining molecular weight distribution functions by use of generating functions and is illustrated by application to random scission and cross-linking reactions.

No. 254. **"Cross-Link Formation in Stretched Rubber Networks."** J. P. Berry, J. Scanlan, and W. F. Watson. 16 pages. This paper describes an experimental and theoretical study of the introduction of cross-links into stretched peroxide-vulcanized rubber by heating it with di-cumyl peroxide *in vacuo*. The observed permanent set and swelling behavior are in fair agreement with theoretical predictions.

"Let Wink Aid Your Automation." F. J. Fink & Co., Chardon, O. 4 pages. This booklet describes the company's Wink universal and basic cutters and equipment for cutting a wide variety of extruded materials.



Publications of Office of Technical Services, United States Department of Commerce, Washington, D. C.:

"Gamma Ray Induced Addition of Bromotrichloromethane to Olefins." PB 121279. 14 pages. Price, 50¢. This report of work done for Wright Air Development Center describes a new technique in organic synthesis which was applied to the preparation of intermediates for monomers to be used in the polymerization of new fluid plastic and elastomeric materials for high-temperature applications in aircraft. The new technique, said to offer numerous advantages over other methods, was adapted for the addition of bromotrichloromethane to olefins by means of a cobalt 60 gamma radiation. The radiation proved a potent source of free radicals for the initiation of conventional free radical reaction. Resulting products were shown to be identical to those gained through use of organic peroxides or ultra-violet light.

"Preparation of Fluorine-Containing Compounds." PB 121818. 27 pages. Price, 75¢. This is a report of a project done for Wright Air Development Center which involved the preparation of new fluorine-containing chemical species by the Simon electrochemical process. Studies were made with some of the resulting materials in order to find unique reactions of these materials and new compounds exhibiting the chemical and thermal stability associated with fluorocarbons. Among the specific activities was the preparation of certain simple fluorocarbon sulfides with fluorocarbon olefins. The synthesis and properties of fluorocarbon derivatives having hetero atoms such as oxygen or nitrogen in the principal carbon chain of the molecule also were studied. Other examinations were made of the perfluoroamides, a new and unexplored class of compounds.

"Design Data for O-Rings and Similiar Elastic Seals." F. W. Tipton, Boeing Airplane Co., for WADC, U. S. Air Force. 113 pages. Price $3.00. To utilize fully the new materials now under development for seal design, a knowledge of the relation between physical properties of the materials and sealing efficiency is required. This report includes a literature survey on O-Rings and seal design and functional tests of O-rings prepared from rubber compounded to have various physical properties.

"High-Temperature Resistant Sealant Materials." L. C. Boller *et al.*, Coast Pro-Seal & Mfg. Co., for WADC, U. S. Air Force. 67 pages. Price $1.75. The object of this project was to develop fuel-tank sealant compounds to withstand fuel vapor temperatures of 540° F. and liquid fuel temperatures of 380° F. for a limited period of time. A study was made of the thermal stability of various commercially available types of butadiene-acrylonitrile polymers and with commercial phenolic resins. A second objective was the development of test procedures.

"Coordination Polymers." W. C. Fernelius, Pennsylvania State University, for WADC, U. S. Air Force. 106 pages. Price $2.75. This research provides information on organic metal-coordination polymers with exceptional thermal stability. It was accomplished through review of the coordination polymer concept and a literature survey, and examination of ways of developing the polymers. Chelate polymers of bis (Beta-diketones) with molecular weights up to 6000 were prepared under varying conditions, and their physical properties determined.

"Polymer Research." Polytechnic Institute of Brooklyn, for Office of Naval Research. 55 pages. Price $1.50. This annual report is concerned with experiments with polymer adsorption and investigation of the effect of polymer structure on wash primer. The molecular weight dependence of the initial part of the adsorption isotherm is predicted. Previous studies are extended on the adsorption and desorption of polyvinyl acetate from metal surfaces. A second section continues earlier work on chromium phosphate wash primer. The final section is a further investigation of the hydrolysis of acetal linkages in polyvinyl butyral. Some linkages were found more stable than others, and this behavior is explained.

"Viscoelastic Properties of High Polymers: Table of Stress-Relaxation Data." E. Catsiff and A. V. Tobolsky, Princeton University, for office of Naval Research. 49 pages. Price $1.25. This volume contains a compilation of the results of stress-relaxation studies of numerous polymers. The tabulated data were read at uniform logarithmic time intervals from smooth curves drawn through the experimental points. The tables also list certain empirical parameters which may be regarded as measures of the steepness of the experimental curves and of their location on the absolute time and modulus scales. Included in the 19 tables are data on such polymers as natural rubber, butadiene-styrene, and Kel-F elastomer.

"Symposium on Preservation for Mobilization Requirements." PB 131007. 524 pages. Price, $8. Papers presented at a joint military-civilian symposium on preservation of materials and equipment held in October, 1956, under U. S. Navy sponsorship, are contained in this volume. Covered are a wide range of problems in the prevention of deterioration of such materials and equipment as rubber, vehicles, construction products, metals, engines, and electrical devices. Preservative materials such as Teflon, organic coatings, and liquid corrosion inhibitors are also dealt with.

"Chlorosulfonation of Silanes and Related Reactions." PB 121973. 37 pages. Price, $1. This report of progress in the synthesis of polar organo-silicon monomers capable of polymerization to synthetic rubber was written by C. G. Overberger and F. M. Beringer, Polytechnic Institute of Brooklyn, on work done for Wright Air Development Center. The use of the polar groups was to decrease the solubility of the silicone rubber in organic solvents as well as to increase the transition temperature. Six preparation methods were attempted. Direct chlorocarbonylation of tetraethylsilane with oxalyl chloride was effected. Vinyl triethoxysilane with methylmagnesium iodide gave vinyl methyldiethoxysilane and vinyl dimethylethoxysilane. Benzyl and phenyl mercaptans were added to those vinyl silanes to give substituted beta-thioethylsilanes.

"Cycolac—High Impact Thermoplastic Resin." Marbon Chemical, Division of Borg-Warner Corp., Gary, Ind. 1 page. This technical data sheet describes the physical and mechanical, electrical and thermal, and chemical properties of Cycolac resins R, T, H, L, LT, high-impact thermoplastic ABS polymers.

"Butadiene—Its Present and Potential Uses." Petro-Tex Chemical Corp., Houston, Tex. 42 pages. This graphically and photographically illustrated booklet contains complete physical properties, polymerization data, chemical properties, and detailed information on all principal butadiene reactions. It includes a series of six family trees showing the chemical structure of present and potential products resulting from various classes of reactions and cites some 286 literature references.

"Rubber Blacks." Columbian Carbon Co., New York, N. Y. 4 pages. This revised property sheet lists and describes the physical and chemical properties of the company's carbon blacks, bone blacks, iron oxide colors, and black colloidal dispersions.

"A Glimpse of Three-T-Fleet, Inc." Three-T-Fleet, Inc., Marfa, Tex. 15 pages. This photographically illustrated booklet describes the purpose and the operation of the company's enterprise, specializing in commercial truck tire testing since June, 1955. The units and details of the test fleet are included. The company also evaluates experimental tires along with the commercially produced tires.

"Kenplast." Kenrich Corp., Maspeth, N. Y. 3 pages. This technical bulletin describes the properties and applications of Kenplast, a light-colored secondary vinyl plasticizer. Typical formulations for its use in garden hose stock and in vinyl wire coating appear.

"NP-10—Key to Superior Plastisols." Eastman Chemical Products, Inc., Kingsport, Tenn. 8 pages. This brochure summarizes various investigations carried out by the company on the effectiveness of its Polymeric Plasticizer NP-10 in vinyl plastisol formulations. Various characteristics are given as well as a number of formulation suggestions involving the use of NP-10 and other plasticizers for such plastisol applications as cloth coating, slush molding, foamed plastisols, and clear films.

"Hycar News Letter." B. F. Goodrich Chemical Co., Cleveland, O. Vol. 6, No. 2. 24 pages. This booklet includes information on softeners evaluated in Hycars 1041, 1042, and 1043; softener study tables; Hycar 4021 for transmission specifications; the use of Carbopol 934 for thickening rubber cement; low-temperature compression set studies; and Hycar pigment studies.

MARKET REVIEWS

Synthetic Rubber

Consumption of new rubber in the United States during September amounted to 120,560 long tons, against 123,861 long tons consumed in August, according to the monthly report of The Rubber Manufacturers Association, Inc. September, 1957, consumption was still higher than the September, 1956, consumption of 113,384 tons. August, 1957, consumption was unusually high for a summer month.

Consumption of synthetic rubber during September was 77,186 tons, against August consumption of 79,015 tons; while natural rubber consumption in September amounted to 43,374 tons, against August consumption of 44,486 tons. The ratio of synthetic to total new rubber of 64.02% was the highest of any month since withdrawal of government specification controls.

By types, synthetic rubber consumption in September, as compared with August, was as follows: SBR, 64,025, against 65,825 tons; neoprene, 6,337, against 6,545; butyl, 4,609, against 4,491; and nitrile, 2,215, against 2,154.

Production of synthetic rubber in September, as compared with August, by types, was given as: SBR, 75,850, against 76,197 tons; neoprene, 9,726, against 9,033; butyl, 6,113, against 5,455; and nitrile, 2,968, against 2,736. Total synthetic rubber production in September amounted to 94,657 tons, compared with 93,421 in August.

Exports of synthetic rubber in September were about equal to those for August at 15,685 for the former and 15,650 for the latter, of which 12,000 tons and 11,000 tons were SBR figures in that order.

In general, synthetic rubber producers appear to be looking for good demand in the fourth quarter of 1957 and the first quarter of 1958, in spite of some curtailment of defense spending and a few soft spots in the overall economy. The most recent sales figures for the rubber products industry for August were $509 million, as compared with $473 million in July, according to the Commerce Department.

Natural Rubber

During the September 16-October 15 period the New York rubber market displayed no particular tendency; the tone varied with overseas cables, indicating a lack of confidence in the present price level. Although offers of shipment rubber are reported to have been on a moderate scale, the attitude of the market has no doubt influenced manufacturers' buying policy, and their interest has repeatedly been described as negligible. Easiness in the market was attributed to small consumer and dealer interest, which at times was too light to support the market. Some traders attributed the lack of buying interest to fully stocked inventories.

Spot prices in New York, registering about 1½¢ high-low price differential, have again followed the trend of previous periods. Contracts traded during this period on the New York Commodity Exchange dropped to 12,670 tons from a previous tonnage of 16,420.

In late September, Ceylon signed a five-year agreement selling at least 30,000 tons of rubber annually to China and buying at least 200,000 tons of rice. In addition, China, it is reported, will grant 15 million rupees in aid annually to help the replanting of rubber trees. Under the old agreement, Ceylon sold 50,000 tons of rubber annually and bought 270,000 tons of rice.

As for the outlook of the Continent, no apparent change in the immediate prospects would seem to have taken place, and the price level remains practically unchanged. The Russian buyer has, however, during a period of somewhat erratic purchasing, taken the burden of considerable quantities of nearby and early shipment rubber off the market, and it seems problematic whether this buying can be continued without disturbing the price level.

The continual drain on near supplies may encourage other buyers, who, for economic and market reasons have delayed buying, to secure their requirements, but until signs appear of a development in this direction there will be an inclination to a cautious policy particularly while Far Eastern stocks remain so high.

September sales, on the New York Commodity Exchange, amounted to 11,870 tons, compared with 18,540 tons for August; none were on the Rubber-Standard Contract. There were 20 trading days during September; 22 during the September 16-October 15 period.

Week-end closing Commodity Exchange futures prices for the Rex Contract follow.

REX CONTRACT

	Sept. 20	Sept. 27	Oct. 4	Oct. 11	Oct. 18
Nov.	29.58	29.70	29.65	29.55	29.60
1958					
Jan.	29.56	29.70	29.61	29.45	29.60
Mar.	29.56	29.70	29.60	29.50	29.60
May	29.56	29.75	29.60	29.41	29.60
July	29.60	29.75	29.50	29.35	29.55
Sept.	29.60	29.75	29.50	29.30	29.55
Nov.	—	29.75	29.45	29.25	29.50
Total weekly sales, tons	4,020	2,730	2,860	2,480	2,170

On the physical market, RSS #1, according to the Rubber Trade Association of New York, averaged 29.62¢ per pound for the September 16-October 15 period. Average September sellers' prices for representative grades were: RSS #3, 29.57¢; #3 Amber Blankets, 28.15¢; and Flat Bark, 21.44¢.

	Sept. 20	Sept. 27	Oct. 4	Oct. 11	Oct. 18
RSS #1	29.63	29.75	29.63	29.50	29.63
2	29.50	29.50	29.25	29.13	29.25
3	29.38	29.25	28.88	28.75	29.00
Pale Crepe					
#1 Thick	34.38	34.50	34.00	33.00	32.75
Thin	33.13	33.25	32.75	32.50	32.25
#3 Amber Blankets	27.88	27.75	27.25	26.75	26.88
Thin Brown Crepe	27.50	27.50	26.63	26.38	26.50
Standard Flat Bark	21.13	21.63	21.50	21.75	21.75

Latex

In the period under review, conditions in the liquid latex market have been, if anything, even quieter than during the preceding period. With only a few exceptions consumers have shown little interest, and they are apparently unwilling to enter into new commitments and are following only a hand-to-mouth policy. On the other hand, no apparent surplus is pressing on the market, and producers who seem to be well sold, anyhow up to the end of the year, are content with adopting a waiting attitude. In consequence the premium has been fairly well maintained.

Malayan August production at 9,692 tons was again well above the monthly average for the past months of this year, which was 8,560 tons as compared with a monthly average of 7,209 tons for the corresponding period of 1956. Shipments from Malaya during the first eight months of 1957 were 68,004 tons and have been running well in line with the production at 68,483 tons for the same period.

The U.S.A. August consumption of natural latex, reported at 6,549 tons, shows some improvement on the low July figure of 5,180 tons, but United States stocks at the end of August increased to 13,528 tons, as compared with 12,185 tons on July 31.

Prices for ASTM Centrifuged Concentrated natural latex, in tank-car quantities, f.o.b., rail tank cars, ranged during the period from 37.0 to 38.5 per pound solids. Synthetic latices were 22.5 to 31.2¢ for SBR; 37 to 55¢ for neoprene; and 46 to 65¢ a pound for nitrile types.

Final July and preliminary August domestic statistics for all latices were reported by Department of Commerce as:

(All Figures in Long Tons, Dry Weight)

Type of Latex	Production	Imports	Consumption	Month-End Stocks
Natural				
July	0	6,243	5,180	12,073
August	0	—	6,549	13,528
SBR				
July	4,646	—	4,269	8,045
August	6,816	—	5,574	8,398
Neoprene				
July	572	0	677	1,296
Aug.	874	0	791	1,202
Nitrile				
July	844	0	480	1,953
Aug.	608	0	626	1,180

CYANAMID **RUBBER**

1907 1957

NO. 13 OF A SERIES Published by AMERICAN CYANAMID COMPANY, Rubber Chemicals Department, Bound Brook, New Jersey

White or Light Rubbers Get Color Insurance from Special Non-Staining Antioxidants

FOAMS

Foams are particularly susceptible to atmospheric degradation. Customers, however, expect *white* foams that stay white and resist pinking, yellowing or crusting. Antioxidant 2246® gives this assurance in a wide range of foam products. Its freedom from odor is important in mattress and pillow applications. Antioxidant 2246 also provides a significant degree of protection against the troublesome reddening and crusting that has been traced to nitrogen oxides from home heating systems.

RUBBER THREAD

Clean, white, long-lasting rubber thread is the essential component of bathing suits, foundation garments and other "stretch" fabrics. Where the *ultimate* in long-lasting whiteness is required, Antioxidant 425® is recommended without qualification. Manufacturers find its non-staining characteristics are unequaled and that its antioxidant action ably protects the strength and elasticity of even the finest rubber filaments.

RUG BACKING

Latex backings on carpets and rugs prevent dangerous skids and help them retain their shape. These light-colored rug backings also add to the crisp, new appearance of the rugs. However, shelf storage and rack display can subject these backings to discoloring influences, and non-staining antioxidants are called for. White or pastel, the colors are protected to the point of sale, and well beyond, when Antioxidant 2246 is used. This applies equally to other rubberized fabric backing applications such as upholstery.

WHITE RUBBER FOOTWEAR

The lively whiteness of the soles and trim of sports shoes or the all-over whiteness of rain boots are essential to a *dressed* appearance. Add the requirements of rugged flexibility through seasons of use and you have a job ideally suited for Antioxidant 2246. In this, as in other applications, Antioxidant 2246 has no effect on compounding or cure characteristics.

THE FINEST RUBBERS

Surgical and pharmaceutical rubber products are generally recognized as the finest quality rubber made. Naturally, non-discoloration is a critical requirement. The properties of these fine rubbers are protected and their color assured with Antioxidant 425 – offered specifically for use in premium rubbers.

BEACH PRODUCTS

Sun, sand and salt air are rough on white and light-colored rubber beach toys and beach wear. Manufacturers of quality products are using Antioxidant 2246 to maintain the bright whiteness or pastel coloring typical of these rubbers – and to preserve surface and flexibility characteristics despite severe outdoor exposure.

* * *

Considerable information on the practical application of these two non-discoloring antioxidants is available from Cyanamid. Your Cyanamid Rubber Chemicals representative will be happy to discuss them with you in detail – or send for the Technical Bulletins, *Antioxidant 2246* and *Antioxidant 425.*

NOBS BULLETIN OFFERED

Modern rubber processing conditions have created a need for accelerators offering extra scorch protection. NOBS No. 1 and NOBS Special* delayed-action accelerators fill these requirements. They have become standard in a wide range of natural and synthetic rubber processing. If you are not familiar with their characteristics, we suggest you send for Cyanamid's bulletin,* "Delayed Action Accelerators."

*Trademark

Scrap Rubber

The scrap rubber market perked up slightly in early October, reflecting the placing of orders by Naugatuck for mixed auto tires for October shipment and as a result of the end of the strike at the major Buffalo reclaimer. These were the first orders placed by Naugatuck since August. Renewed buying activity by Naugatuck, plus the end of the strike and resumption of shipments to that western New York reclaimer, gave the market a slight lift.

Naugatuck orders, however, were placed on the basis of $8 for mixed auto tires, with Buffalo at $11 and Akron at $12.

	Eastern Points	Akron O.
	Per Net Ton	
Mixed auto tires	$8.00-$12.00	$12.00
S. A. G. truck tires	Nom.	15.50
Peelings, No. 1	Nom.	23.00
2	Nom.	20.00
3	Nom.	20.00
Tire buffings	Nom.	Nom.
	(¢ per Lb.)	
Auto tubes, mixed	2.75	2.75
Black	6.25	6.25
Red	6.50	7.00
Butyl	3.50	3.50

Reclaimed Rubber

The period between mid-September and mid-October revealed a continued good market in the reclaim business. One reclaimer reported that its sales were the best in a long time. It is expected that the market for reclaimed rubber will continue good for the near-term future.

According to The Rubber Manufacturers Association, Inc., report, September production of reclaimed rubber reached 20,100 tons; while consumption was 22,200 long tons. During the nine-month period ending in September, domestic production totaled 203,094 tons; total consumption amounted to 203,994 tons.

Reclaimed Rubber Prices

Whole tire, first line	$0.11
Third line	.1025
Inner tube; black	.16
Red	.21
Butyl	.14
Light carcass	.22
Mechanical, light colored, medium gravity	.15
Black, medium gravity	.085

The above list includes those items or classes only that determine the price basis of all derivative reclaim grades. Every manufacturer produces a variety of special reclaims in each general group separately featuring characteristic properties of quality, workability, and gravity at special prices.

Industrial Fabrics

Buying of broken twills by the automobile industry for vinyl-coated seat backings became much more active during the September 16-October 15 period, with auto producers and plastics coaters placing orders for these goods for spot and November delivery. Spots on this fabric also are reported becoming tight in supply, and market observers look for a firming trend.

Inquiries also were received for a fairly sizable quantity of narrow enameling ducks, with the industrial apron trade looking for the 38-inch, double-filled, 2.00 yard fabric at 28¢ for first-quarter delivery. Some transactions at this level were reported.

Trading in wide sateens and drills generally was slow, with relatively small lots selling for quick and nearby delivery.

Industrial Fabrics

Drills		
59-inch 1.85 yd.	*yd.*	$0.335/.34
2.25-yd.		.285/.29
Ducks		
38-inch 1.78-yd. S.F.	*yd.*	nom.
2.00-yd. D.F.		.30
51.5-inch, 1.35-yd. S.F.	*yd.*	....
Hose and belting		.63
Osnaburgs		
40-inch 2.11-yd.	*yd.*	.2275
3.65-yd.		.1525
Raincoat Fabrics		
Printcloth, 38½-in., 64-60, 5.35-yd.	*yd.*	.1325
6.25-yd.		.1165
Sheeting, 48-inch, 4.17-yd.		.20
52-inch, 3.85-yd.		.2275
Chafer Fabrics		
14.40-oz./sq. yd. Pl.	*yd.*	.73
11.65-oz./sq. yd. S.		.61
10.80-oz./sq. yd. S.		.6575
8.9-oz./sq. yd. S.		.67
Other Fabrics		
Headlining, 59-in., 1.65-yd., 2-ply	*yd.*	.41
64-inch, 1.25-yd., 2-ply		.59
Sateens, 58-inch, 1.32-yd.		.52/.525
58-inch, 1.21-yd.		.5675

Rayon

Total packaged production of rayon and acetate filament yarn during September was 53,800,000 pounds, consisting of 23,000,000 pounds of high-tenacity rayon yarn and 30,800,000 pounds of regular-tenacity rayon yarn. August production had been: total 54,200,000; regular-tenacity yarn, 30,000,000, and high-tenacity rayon yarn, 24,200,000 pounds.

Filament yarn shipments to domestic consumers totaled 53,600,000 pounds, of which 21,500,000 pounds were high-tenacity rayon yarn and 32,100,000 pounds were regular-tenacity rayon yarn. August shipments had been: total, 53,700,000 pounds; high-tenacity, 22,600,000 pounds; regular-tenacity, 31,100,000 pounds.

Total end of September stocks were 68,400,000 pounds, made up of 15,000,000 pounds of high-tenacity rayon yarn and 53,400,000 pounds of regular-tenacity rayon yarn. End of August stocks had been: total, 69,600,000 pounds; high-tenacity yarn, 14,600,000 pounds; regular-tenacity, 55,000,000 pounds.

There have been no price changes of rayon and filament yarns recently.

Rayon Prices

Tire Fabrics	
1100/490/2	$0.69 /$0.73
1650/980/2	.63 / .725
2200/980/2	.625/ .655
Tire Yarns	
High-Tenacity	
1100/ 490, 980	$0.59/$0.64
1100/ 490	.59/ .63
1150/ 490, 980	.59/ .63
1165/ 480	.59/ .65
1230/ 490	.59/ .63
1650/ 720	.55/ .58
1650/ 980	.55/ .58
1875/ 980	.55/ .58
2200/ 960	.54/ .57
2200/ 980	.54/ .57
2200/1466	.64
4400/2934	.60
Super-High Tenacity	
1650/ 720	.58
1900/ 720	.58

France

(*Continued from page 292*)

The use of rubber footwear is increasing all over the world, it was said; in France the rise during 1950-1956 came to 70%, and in Germany, to 84%.

Adversaries of rubber footwear also emphasize the vulnerability of this industry in a war because, it is claimed, factories are concentrated in a few areas. The rubber footwear manufacturers retort that on the contrary, this industry is not more vulnerable in this respect than the leather industry; rubber shoes are made by some 40 firms in about 30 different departments, and soling by 300 firms in more than 50 departments.

Finally, FRMA added, that if the use of rubber in footwear for the army were prohibited, the most important section of the rubber industry (after the tire branch) would suffer, a branch that produced 52,000 tons of goods in 1956, consisting of 27 million pairs of footwear and 75 million pairs of soles and heels.

Nigeria

Investors Sought; Rubber Production and Export Up

Nigeria has engaged in a campaign to interest foreign investors in its economic possibilities. Last year a mission from Western Nigeria visited the United States, the United Kingdom, Canada, Japan, Germany, and Italy for this purpose, with very encouraging results, it appears. Recently a similar mission also went to Sweden, composed of Chief Obafemi Awolowo, the West Nigerian Premier; R. A. Croft, chairman of the Western Nigerian Production Development Board; A. Hastrup, West Nigerian Trade Officer, in London, and Chief Sawole, London representative for Western Nigerian Trade Development. In a press conference in Stockholm, Chief Awolowa stated that Nigeria's foreign trade had increased more than 200% in the past 10 years. A five-year plan has been adopted to spend £105,000,000 on social and economic development by 1960.

Nigeria's rubber plantation industry is developing rapidly, and exports have al-

(*Continued on page 324*)

Synthetic Rubbers and Latices*

Monomers

Acrylonitrile	lb.	$0.27	
Butadiene	lb.	.15	
Dow Styrene N99, H99	lb.	.205	
RG	lb.	.17	
Vinyltoluene	lb.	.17	
Hylene M	lb.	3.50	/ $5.00
M-50	lb.	1.90	/ 3.40
T	lb.	1.10	/ 2.65
TM	lb.	.95	/ 2.50
-65	lb.	1.00	/ 2.55
Isobutylene	lb.	.38	
Isoprene	lb.	.25	
Monomer MG-1	lb.	1.00	/ 1.25
Mondur-C	lb.	1.05	
-S	lb.	.85	
Multron R-2	lb.	.54	
Rohm & Haas ethyl acrylate	lb.	.34	/ .36
Glacial methacrylic acid	lb.	.45	/ .47
Methyl acrylate	lb.	.37	/ .39
Methacrylate	lb.	.29	/ .31

Shortstops

DDM	lb.	.75	/ .88
Mercaptan 174	lb.	.38	/ .50
Shortstop 204	lb.	.33	/ .37
268	lb.	.52	/ .53
Tecquinol	lb.	.825	/ .845
Thiostop K	lb.	.53	
N	lb.	.41	
Vulnapol KM	lb.	.52	/ .53
NM	lb.	.38	/ .42

Acrylic Types

Hycar 4021	1.35[c]
4501	.81[c]

Fluorocarbon Types

Kel-F Elastomer lb.	15.00 / 16.00

Isobutylene Types

Deenax lb.	.94[b] / 1.05[b]
Enjay Butyl 035, 150, 215, 217, 218, 325	.23[a]
065, 165, 265, 267	.255
268, 365	.24[a]
Hycar 2202	.65[c]
Polysar Butyl 100, 200, 300, 400	.245[c]
101	.2775[a]
301	.255[c]
Vistanex	.45[a]

Neoprene

Neoprene Type AC, CG	.55[a]
GN, GN-A, WX	.41[a]
GRT, S	.42[a]
KNR	.75[a]
W, WHV	.39[a]
WRT	.45[a]

Latices

Neoprene Latex 571, 842-A	.37[a]
572	.39[a]
60, 601-A	.40[a]
635	.41[a]
650	.42 / .53[a]
735, 736	.38[a]
750	.39 / .50[a]
950	.47[a]

Nitrile Types

Butaprene NAA	.54[a]
NF	.49[a]
NL	.50[a]
NXM	.58[a]
Chemigum N1NS	.64[b]
N3NS, N5	.58[b]
N6, N-6B, N7	.50[b]
Hycar 1001, 1041	.58[c]
1002, 1042, 1043, 1312	.50[c]
1014	.60[c]
1411	.62[c]
1432	.59[c]
1441	.64[c]
Paracril AJ	.485[c]
B, BJ, BJLT, BLT	.50[c]
C, CLT	.58[c]
CV	.59[c]
D	.65[c]
18-80	.60[c]
Polysar Krynac 800, 802, 803	.50[c]
801	.58[c]

Latices

Butaprene N-300	.46[b]
N-400, N-401	.54[b]
Chemigum 200	.49[b]
235 CHS, 236	.54[b]
245 B, 245 CHS, 246, 247	.46[b]
Hycar 1512, 1552, 1562, 1577	.46[c]
1551, 1561, 1571	.54[c]
1852	.46[c]
Nitrex 2612, 2614	.46[a]
2615	.51[a]

Polyethylene Type

Hypalon 20 lb.	.65

Polysulfide Types

Thiokol LP-2, -3, -31, -32, -33	$0.96[a]
-8, -38	1.25[a]
PR-1	.95[a]
Type-A	.47[a]
FA	.69[a]
ST	1.00[a]

Latices

Thiokol Latex (dry wt.)	
Type MF	.85[a]
MX	.70[a]
WD-2	.92[a]
-5	.95[a]
-6, -7	.70[a]

Silicone Types

GE (compounded)	$2.25[c]	/ 4.10[c]
Silicone gum (not compounded)	3.85[b]	/ 4.90[c]
Silastic (compounded)	1.95[b]	/ 3.65[b]
(Partly compounded)	3.25[b]	/ 4.35[b]
(Uncompounded)	3.85[b]	/ 4.50[b]
Union Carbide (compounds)	2.35[b]	/ 3.20[b]
(Gums)	3.85[b]	/ 4.25[b]

Styrene Types†

Hot SBR‡

Ameripol 1000, 1001, 1006	.241[c]
1002	.2435[c]
ASRC 1000, 1001, 1004, 1006	.241[c]
1018	.270[c]
1019	.265[c]
FR-S 1000, 1001, 1004, 1006	.241[c]
1009	.2475[c]
1010	.26[c]
1012	.2425[c]
1013	.25[c]
1014	.281[c]
1015	.291[c]
Naugapol 1016, 1019	.265[b]
1018	.27[b]
1021	.30[b]
1022	.28[b]
1023	.285[b]
Philprene 1000, 1001, 1006	.241[b]
1009	.2475[b]
1010	.26[b]
1018	.27[b]
1019	.265[b]
Plioflex 1006	.241[c]
Polysar Kryflex S, S-50	.241[c]
S-X-371	.255[c]
S-1000, -1001, -1006, -1013	.23[a]
-1002, -1011	.2325[a]
Synpol 1000, 1001, 1006, 1007, 1061	.241
1002	.2435[b]
1012	.2425[b]
1009	.2475[b]
1013	.25[b]

* Prices are per pound carload or tank-car dry weight unless otherwise specified.

[a] Freight extra.

[b] Minimum freight allowed.

[c] Freight prepaid.

‡SBR —Styrene-butadiene rubber.

§BR —Butadiene rubber.

† Listed below are the new SBR type synthetic rubbers and latices trade names and the chief sales offices of their producers or distributors.

Ameripol	—Goodrich-Gulf Chemicals, Inc., 3135 Euclid Ave., Cleveland 15, O.
ASRC	—American Synthetic Rubber Corp., 500 Fifth Ave., New York 36, N. Y.
Baytown	—United Rubber & Chemical Co., Baytown, Tex. (producer); United Carbon Co., Inc., Charleston 27, W. Va. (distributor).
Butaprene, FR-S	—Firestone Tire & Rubber Co., Synthetic Rubber Division, 381 Wilbeth Rd., Akron 1, O.
Copo	—Copolymer Rubber & Chemical Corp., P. O. Box 2595, Baton Rouge 1, La.
Naugapol, Naugatex	—Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn.
Philprene	—Phillips Chemical Co., Rubber Chemicals Division, 318 Water St., Akron 8, O.
Plioflex	—Goodyear Tire & Rubber Co., Chemical Division, Akron 16, O.
Pliolite Latex	—Goodyear Tire & Rubber Co., Chemical Division. Also distributed by General Latex & Chemical Corp., 666 Main St., Cambridge 39, Mass.
Polysar	—Polymer Corp., Ltd., Sarnia, Ont., Canada (producer); H. Muehlstein & Co., Inc., 60 E. 42nd St., New York 17, N. Y. (distributor).
S-	—Shell Chemical Corp., Synthetic Rubber Sales Division, 50 W. 50th St., New York 20, N. Y.
Synpol	—Texas-U. S. Chemical Co., Port Neches, Tex. (producer); Naugatuck Chemical (distributor).

Hot SBR Black Masterbatch

Philprene 1100	$0.194
1104	.190[b]
S-1100	.185[a]

Cold SBR

Ameripol 1500, 1501, 1502	.241[c]
ASRC 1500, 1502	.241[c]
1503	.2625[c]
Copo 1500, 1502	.241[c]
1505	.261[c]
FR-S 1500, 1502	.241[c]
Naugapol 1503	.2625[b]
1504	.295[b]
Philprene 1500, 1502	.241[b]
1503	.2625[b]
Plioflex 1500, 1502	.241[c]
Polysar Krylene	.241[c]
S-1500, -1501, -1502	.23[b]
Synpol 1500, 1502, 1551	.241[b]

Cold SBR Black Masterbatch

Baytown 1600, 1601, 1602	.176[a]
Philprene 1600, 1601	.193[b]
1605	.19[b]
S-1600, -1601, -1602	.1825[a]

Cold SBR Oil Masterbatch

Ameripol 1703	.206[c]
1705	.2035[c]
1707	.191[c]
1710, 1712	.1885[c]
ASRC 1703	.206[c]
1708	.191[c]
Copo 1712	.1885[c]
FR-S 1703	.206[c]
1705	.2035[c]
1712	.1885[c]
Philprene 1703	.206[b]
1706	.203[b]
1708	.191[b]
1712	.1885[b]
Plioflex 1703, 1773	.206[c]
1710, 1712	.1885[c]
1778	.191[c]
Polysar Kryflex 200	.241[c]
SS-250	.30[c]
Polysar Krylene NS	.241[c]
Polysar Krynol 651	.1885[c]
652	.191[c]
S-1703	.195[a]
1705, 1706	.1925[a]
-1707	.18[a]
-1709, -1712	.1775[a]
Synpol 1703	.206[b]
1707, 1708	.191[b]
1711	.19[b]

Cold SBR Oil-Black Masterbatch

Baytown 1801	.16[a]
Philprene 1803	.174[b]
S-1801	.1675[a]

Hot SBR Latices

FR-S 2000, 2001, 2006	.26[a]
2002	.285[a]
2003, 2004	.295[a]
Naugatex 2000, 2001, 2006	.263[a]
2002	.288[a]
2005	.30[a]
Pliolite Latex 2000, 2001	.2775[c]
2076	.29[c]
S-2000	.2275[a]
2006	.215[a]

Cold SBR Latices

Copo 2101, X-765	.30[c]
2102, 2105	.32[c]
FR-S 2105	.31[a]
Naugatex 2101	.285[a]
2105	.312[a]
X-767	.323[a]
Pliolite Latex 2101, X765	.30[c]
2105	.32[c]
S-2101	.225[a]
-2105	.31[a]

Cold BR Latex§

Pliolite Latex 2104	.32[c]

•

Crown Rubber Co., Fremont, O., has a new development whereby neoprene foam rubber is permanently cured to various types of fabrics, including supporting vinyls. Gages of 1/20-inch to 3/8-inch in foam may be applied by the process. There is virtually no restriction to the length of the rolls and the width of the neoprene, and fabric may be as great as nine feet. Advantages of the neoprene foam are resistance to fire and heat, oil, and greases.

Compounding Ingredients*

Abrasives

Pumicestone, powdered	lb.	$0.0363	$0.065
Rottenstone, domestic	lb.	.03	.04
Shelblast	ton	80.00	165.00
Walnut Shell Grits	ton	50.00	160.00

Accelerators

A-1 (Thiocarbanilide)	ton	50	57
A-32	ton	.66	.80
A-100	lb.	.52	.66
Accelerator 49		.59	.60
52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	4.25	
89	lb.	1.20	
108	lb.	.91	
552	lb.	2.25	
808	lb.	.66	.68
833	lb.	1.17	1.19
Altax	lb.	.50	.52
Arazate	lb.	2.25	
Beutene	lb.	.66	.71
Bismate	lb.	3.00	
B-J-F	lb.	.27	.32
Butasan	lb.	1.04	
Butazate	lb.	1.04	
Butyl Accelerator Eight	lb.	1.10	1.35
Zimate	lb.	1.04	
Captax	lb.	.40	.42
C-P-B	lb.	1.95	
Cumate	lb.	1.45	
Dibs	lb.	.85	
Diesterex N		.50	.57
Dipac	lb.	.85	
DOTG (diorthotolylguanidine)			
Cyanamid	lb.	.64	.65
Du Pont	lb.	.62	.63
DPG (diphenylguanidine)			
Cyanamid	lb.	.54	.55
Monsanto	lb.	.52	58
El-Sixty	lb.	.62	.64
Ethasan	lb.	1.04	
Ethazate	lb.	1.04	
50-D	lb.	.85	
Ethyl Thiurad	lb.	1.04	
Tuads	lb.	1.04	
Tuex	lb.	1.04	
Zimate	lb.	1.04	
Ethylac #650	lb.	.93	.95
Guantal	lb.	.60	.67
Hepteen	lb.	.44	.50
Base	lb.	1.85	
Ledate	lb.	1.04	
MBT (2-mercaptobenzothiazole)			
American Cyanamid	lb.	.44	.46
Du Pont	lb.	.42	.44
Naugatuck	lb.	.42	.47
-XXX, Cyanamid	lb.	.55	.57
MBTS (mercaptobenzothiazyl disulfide)			
Cyanamid	lb.	.54	.56
Du Pont	lb.	.52	.54
Naugatuck	lb.	52	.57
-W Cyanamid	lb.	59	.61
Merac #225	lb.	.75	1.05
Mertax	lb.	.55	.57
Methasan	lb.	1.04	
Methazate	lb.	1.04	
Methyl Tuads	lb.	1.14	
Zimate	lb.	1.04	
Monex	lb.	1.14	
Mono-Thiurad	lb.	1.14	
2-MT (2-mercaptothiazoline)			
Cynamid	lb.	.88	.90
Du Pont	lb.	1.00	
NOBS No. 1	lb.	.76	.78
Special	lb.	.80	.82
O-X-A-F	lb.	.53	.58
Pentex	lb.	1.14	
Flour	lb.	.26	
Permalux	lb.	2.17	
Phenex	lb.	.52	.59
ip-Pip		2.07	
R-2 Crystals	lb.	4.35	
Rotax	lb.	.51	.53
RZ-50, -50B	lb.	1.00	
S. A. 52	lb.	1.14	
57, 62, 67, 77	lb.	1.04	
66	lb.	2.50	
Santocure	lb.	.76	.78
NS	lb.	.80	.82
Selenacs	lb.	4.25	
SPDX-GH	lb.	.69	74
GL	lb.	1.20	1.34
Tellurac	lb.	1.21	
Tepidone	lb.	.45	.48
Tetrone A	lb.	1.91	
Thiofide	lb.	.54	.56
S	lb.	.64	.66
Thionex	lb.	1.14	
Thiotax	lb.	.44	.46
Thiurad	lb.	1.14	
Thiuram E	lb.	1.04	
M	lb.	1.14	
Trimene	lb.	.56	.62
Base	lb.	1.03	1.10
Tuex	lb.	1.14	
Ultex	lb.	1.00	1.10
Unads	lb.	1.14	
Ureka Base	lb.	.66	.73
Vulcacure NB	lb.	.45	
NS	lb.	.75	1.05
ZB, ZE, ZM	lb.	.85	.89
Z-B-X	lb.	$2.45	
Zenite	lb.	.52	$0.54
A	lb.	.62	.64
Special	lb.	.53	.55
Zetax	lb.	.51	.53
Zimate	lb.	1.04	

Accelerator-Activators, Inorganic

Lime, hydrated	ton	21.96	
Litharge, comml	lb.	.1625	.18
Eagle, sublimed	lb.	.18	
National Lead, sublimed	lb.	.1635	.19
Red lead, comml	lb	.185	.195
Eagle	lb.	.1675	
National Lead	lb.	.19	
White lead, carbonate	lb.	.19	.20
Eagle	lb.	.19	.20
National Lead	lb.	.18	.19
Silicate	lb.	.1725	.1825
Eagle	lb.	.20	.2175
National Lead	lb.	.1625	.1725
Zinc oxide, comml.†	lb.	.145	.1925

Accelerator-Activators, Organic

Aktone	lb.	.2125	.2325
Barak	lb.	.62	
Capital 170	lb.	.19	.24
171	lb.	.1425	.1925
700, 701	lb.	.17	.22
705, 710	lb.	.17	.22
800	lb.	.1275	.1525
801	lb.	.16	.185
802	lb.	.165	.19
803	lb.	.1875	.2125
Curade	lb.	.57	.59
D-B-A	lb.	1.95	
Emery 600	lb.	.1425	.1925
Groco 30	lb.	.1425	.1925
35	lb.	.1475	.1975
Guantal	lb.	.62	.64
Hyfac 400	lb.	.1062	.1375
430	lb.	.1612	.1925
431	lb.	.1837	.215
Hystrene S-97	lb.	.1863	.2125
T 45	lb.	.1638	.19
T-70	lb.	.1738	.20
Industrene B	lb.	.1263	.1525
R	lb.	.1138	.14
158	lb.	.1313	.1575
254	lb.	.1413	.1675
262	lb.	.1513	.1775
Laurex	lb.	.33	.37
MODX	lb.	.295	.345
NA-22	lb.	1.00	
Oleic acid, comml.	lb.	.185	.225
Emersol 210 Elaine	lb.	.17	.22
Groco 2, 4, 8, 18	lb.	.17	.22
Plastone	lb.	.27	.30
Polyac	lb.	1.85	
Ridacto	lb.	.25	.26
Seedine	lb.	.1485	.1703
Stearex Beads	lb.	.1488	.1588
Stearic acid			
Emersol 120	lb.	.19	
150	lb.	.2225	
Hydrofoil 51	lb.	.09	
Hydrogenated, rubber grd.			
Groco	lb.	.1275	.1525
Rufat 75	lb.	.1062	.1325
Single pressed, comml.	lb.	.1475	.1675
Emersol 110	lb.	.1533	.185
Groco 53	lb.	.16	.185
Wilmar 253	lb.	.1525	.1775
Double pressed, comml.	lb.	.1525	.1725
Groco 54	lb.	.165	.19
Wilmar 254	lb.	.1575	.1825
Triple pressed, comml.	lb.	.175	.195
Groco 55	lb.	.1875	.2125
Wilmar 255	lb.	.1875	.2125
Sterene 60-R	lb.	.09	.1075
Tonox	lb.	.515	.605
Vimbra	lb.	.32	.385
Vulklor	lb.	.88	1.08
Wilmar 110	lb.	.17	.22
434	lb.	.1425	.1925
Zinc stearate, comml.	lb.	.39	.44

Antioxidants

AC-1	lb.	.37	.86
-5	lb.	1.49	1.63
AgeRite Alba	lb.	2.35	2.45
Gel	lb.	.64	.66
H. P.	lb.	.72	.74
Hipar	lb.	.98	1.00
Powder	lb.	.52	.54
Resin	lb.	.75	.77
D	lb.	.52	.54
Spar	lb.	.52	.54
Stalite	lb.	.52	.54
S	lb.	.52	.54
White	lb.	1.45	1.55
Akroflex C	lb.	.81	.83
CD	lb.	.76	.78
Albasan	lb.	$0.69	$0.73
Allied AA 1144	lb.	.23	.24
AA-1177	lb.	.155	.165
Aminox	lb.	.55	.60
Antioxidant 425	lb.	2.47	2.50
2246	lb.	1.50	1.53
Antis	lb.	.23	.24
Antisun	lb.	.15	.51
Antox	lb.	.55	.57
Aranox	lb.	3.25	54
Betanox Special	lb.	.85	.90
B-L-E, -25	lb.	.55	.60
Burgess Antisun Wax	lb.	.185	
B-X-A	lb.	.55	.60
Catalin AC-5	lb.	1.49	1.63
Copper Inhibiter X-872-L	lb.	2.01	
D-B-P-C	lb.	.91	1.16
Flectol H		.57	.59
Flexamine	lb.	.76	.81
Heliozone	lb.	.31	.32
Ionol	lb.	.91	1.65
Microflake	lb.	.20	.24
NBC	lb.	1.55	
Neozone A	lb.	.59	.61
C	lb.	.83	
D	lb.	.55	.57
Nevastain A	lb.	.51	.61
B	lb.	.51	.70
Octamine	lb.	.55	.60
PDA-10	lb.	.46	.48
Perflectol	lb.	.61	.68
Permalux	lb.	2.17	
Polygard	lb.	.55	.60
Polylite	lb.	.55	.60
Protector	lb.	.26	.31
Rio Resin	lb.	.60	.62
Santoflex 35	lb.	.72	.79
75	lb.	1.01	1.03
AW	lb.	.79	.81
B	lb.	.52	.59
BX	lb.	.63	.70
DD	lb.	.57	.59
Santovar A	lb.	1.55	1.57
Santowhite Crystals, Powder	lb.	1.55	1.62
L	lb.	.57	.59
MK	lb.	1.25	1.32
Stabilite	lb.	.55	.59
Alba	lb.	.72	.79
L	lb.	.60	.64
White	lb.	.52	.66
Powder	lb.	.41	.47
Styphen I	lb.	.51	.55
Sunolite #100	lb.	.21	.23
#127	lb.	.17	.19
Sunproof-713	lb.	.25	.30
Improved	lb.	.25	.30
Jr.	lb.	.20	.25
Tenamene 3	lb.	.91	1.05
Thermoflex	lb.	1.00	1.02
Tonox	lb.	.52	.57
Tysonite	lb.	.24	.2475
Velvapex 51-250	lb.	.40	
V-G-B	lb.	.75	.80
Wing-Stay S	lb.	.53	.65
Zalba	lb.	1.10	
Zenite	lb.	.52	.54

Antiozonants

Tenamene 30, 31	lb.	1.24	1.28
UOP 88, 288	lb.	1.25	1.29

Antiseptics

Copper naphthenate, 6-8%	lb.	.245	
Pentachlorophenol	lb.	.22	.30
Resorcinol, technical	lb.	.775	.785
Zinc naphthenate, 8-10%	lb.	.245	.30

Blowing Agents

Ammonium bicarbonate	lb.	.07	.09
Carbonate	lb.	.16	
Blowing Agent CP 1475	lb.	.32	.35
Celogen	lb.	1.95	
50 C	lb.	1.01	1.07
Opex 40	lb.	.75	.76
Sodium bicarbonate	100 lbs.	2.55	3.85
Carbonate, tech.	100 lbs.	1.35	5.52
Sponge Paste	lb.	.20	
Unicel ND	lb.	.76	
NDX	lb.	1.52	
S	lb.	.20	

Bonding Agents

Braze	gal.	6.00	9.00
Cover cement	gal.	2.50	4.00
Chemlok 201, 203	gal.	5.00	7.50
220	gal.	9.25	12.00
401	gal.	11.70	14.40
602	gal.	25.00	26.00
607	gal.	18.00	
614	lb.	4.35	4.75
Flocking Adhesive RFA17, RFA22, RFA25	lb.	.50	
G-E Silicone Paste SS-15	lb.	4.52	5.10
SS-64	lb.	3.65	6.75
-67 Primer	lb.	7.50	12.50
Gen-Tac Latex	lb.	.70	.805
Hylene M	gal.	3.50	3.75
M-50	gal.	1.90	2.15
Kalabond Adhesive	gal.	6.50	16.00
Tie Cement	gal.	2.00	5.60
Thixons	gal.	1.48	12.00
Ty Ply, BN, Q, S, UP, 3640	gal.	6.75	8.00
RC	gal.	3.75	5.00

* Prices, in general, are f.o.b. works. Range indicates grade or quantity variations. No guarantee of these prices is made. Spot prices should be obtained from individual suppliers.

† For trade names, see Color—White, Zinc Oxides.

‡ At the request of the suppliers, the lowest prices shown for carbon blacks are for carloads in bags. Prices for hopper carloads are lower.

Brake Lining Saturants

BRT 3	lb.	$0.018 /	$0.0265
Resinex L-S	lb.	.0225/	.03

Carbon Blacks‡

Conductive Channel—CC

Continental R-40	lb.	.23 /	.30
Kosmos/Dixie BB	lb.	.23 /	.30
Spheron C	lb.	.15 /	.195
Voltex	lb.	.18 /	.315

Easy Processing Channel—EPC

Collocarb EPC	lb.	.059 /	.099
Continental AA	lb.	.074 /	.1225
Kosmobile 77/Dixiedensed 77	lb.	.074 /	.1225
Micronex W-6	lb.	.0775/	.145
Spheron #9	lb.	.0725/	.1225
Texas E	lb.	.074 /	.1225
Witco #12	lb.	.074 /	.1225
Wyex EPC	lb.	.0775/	.135

Hard Processing Channel—HPC

Continental F	lb.	.074 /	.1225
HX HPC	lb.	.074 /	.1225
Kosmobile S/Dixiedensed S	lb.	.074 /	.1225
Micronex Mk. II	lb.	.0775/	.145
Witco #6	lb.	.074 /	.1225

Medium Processing Channel—MPC

Arrow MPC	lb.	.0775/	.135
Continental A	lb.	.074 /	.1225
Kosmobile S-66/Dixiedensed S-66	lb.	.0775/	.145
Micronex Standard	lb.	.0725/	.145
Spheron #6	lb.	.0725/	.1225
Texas 109	lb.	.079 /	.1275
M	lb.	.074 /	.1225
Witco #1	lb.	.074 /	.1225

Conductive Furnace—CF

Aromex CF	lb.	.0875/	.145
Vulcan C	lb.	.105 /	.15
SC	lb.	.18 /	.223

Fast Extruding Furnace—FEF

Arovel FEF	lb.	.0675/	.125
Continex FEF	lb.	.06 /	.10
Kosmos 50/Dixie 50	lb.	.06 /	.10
Philblack A	lb.	.0675/	.115
Statex M	lb.	.0675/	.125
Sterling SO	lb.	.0625/	.10

Fine Furnace—FF

Statex B	lb.	.0725/	.13
Sterling 99	lb.	.0675/	.105

High Abrasion Furnace—HAF

Aromex HAF	lb.	.0775/	.135
Continex HAF	lb.	.079 /	.125
Kosmos 60/Dixie 60	lb.	.079 /	.1175
Philblack O	lb.	.0775/	.125
Statex R	lb.	.0775/	.135
Vulcan #3	lb.	.0725/	.114

Intermediate Super Abrasion Furnace—ISAF

Aromex ISAF	lb.	.0925/	.15
Kosmos 70/Dixie 70	lb.	.10 /	.145
Philblack I	lb.	.0925/	.14
Statex 125	lb.	.0925/	.15
Vulcan 6	lb.	.0875/	.13

Super Abrasion Furnace—SAF

Philblack E	lb.	.115 /	.1625
Vulcan 9	lb.	.115 /	.165

General-Purpose Furnace—GPF

Arogen GPF	lb.	.06 /	.1175
Sterling V	lb.	.055 /	.09
V Non-staining	lb.	.05 /	.09

High Modulus Furnace—HMF

Collocarb HMF	lb.	.045 /	.085
Continex HMF	lb.	.055 /	.095
Kosmos 40/Dixie 40	lb.	.055 /	.095
Modulex HMF	lb.	.0625/	.12
Statex 93	lb.	.0625/	.12
930	lb.	.047 /	.087
Sterling L, LL	lb.	.0575/	.095

Semi-Reinforcing Furnace—SRF

Collocarb SRF	lb.	.042 /	.082
Continex SRF	lb.	.045 /	.085
Essex SRF	lb.	.0575/	.115
Furnex	lb.	.0575/	.115
Gastex	lb.	.0575/	.0925
Kosmos 20/Dixie 20	lb.	.045 /	.085
Pelletex, NS	lb.	.0525/	.0875
Sterling NS, S	lb.	.0475/	.0875
R	lb.	.0575/	.0925

Fine Thermal—FT

P-33	lb.	.0575	
Sterling FT	lb.	.0575	

Medium Thermal—MT

Sterling MT	lb.	$0.04	
Non-staining	lb.	.05	
Thermax	lb.	.04	
Stainless	lb.	.05	

Colors

Black

Iron oxides, comml	lb.	.1235/	$0.135
BK—Lansco	lb.	.1275/	.13
Williams	lb.	.145	
Lansco synthetic	lb.	.10	
Mapico	lb.	.1475/	.15
Lampblack, comml	lb.	.16 /	.45
Superjet	lb.	.085 /	.12
Permanent Blue	lb.	.80 /	1.05
Stan-Tone	lb.	.45 /	1.20
Vansul masterbatch	lb.	.60 /	.65
Paste	lb.	.14 /	.15

Blue

Alkali Blue	lb.	1.12 /	2.10
Cyanamid ultramarine	lb.	.29	
Du Pont	lb.	1.77 /	4.55
Filo	lb.	.28	
Heveatex pastes	lb.	.80 /	1.45
Lansco ultramarines	lb.	.25 /	.28
Monsanto Blue 7	lb.	1.55	
11	lb.	3.45	
DPB-283	lb.	1.93	
S-11	lb.	2.05	
Permanent Blue	lb.	.80 /	1.05
Stan-Tone Violet Blue D-4900	lb.	1.97 /	2.15
Vansul masterbatch	lb.	.90 /	2.70

Brown

Filo	lb.	.13	
Iron oxides, comml	lb.	.1425/	.145
Lansco synthetic	lb.	.125	
Mapico Brown	lb.	.1575/	.16
Sienna, burnt, comml	lb.	.0425/	.155
Williams	lb.	.115 /	.1775
Raw, comml	lb.	.045 /	.1325
Williams	lb.	.08 /	.1725
Umber, burnt, comml	lb.	.06 /	.07
Williams	lb.	.0725/	.085
Raw, comml	lb.	.0625/	.07
Williams	lb.	.07 /	.0825
Williams, pure brown	lb.	.155	
Vandyke	lb.	.12	
Mapico Tan	lb.	.2325/	.235
Metallic Brown	lb.	.05 /	.06
Vansul masterbatch	lb.	2.10 /	2.20

Green

Chrome	lb.	.19 /	.50
Green	lb.	.80 /	2.40
Oxide	lb.	.3925/	1.10
Cyanamid	lb.	1.10	
G-4099, -6099	lb.	.4525	
GH-9869	lb.	1.10 /	1.25
9976	lb.	1.20 /	1.35
Du Pont	lb.	1.97 /	2.80
Filo	lb.	.40	
Heveatex pastes	lb.	.95 /	1.85
Lansco Toner	lb.	1.35	
Monsanto Green 3	lb.	2.75	
14	lb.	1.45	
17	lb.	3.95	
71205	lb.	1.35	
DGP	lb.	2.03	
S-17	lb.	2.25	
Stan-Tone	lb.	1.75 /	4.60
Vansul masterbatch	lb.	2.00 /	2.60

Orange

Cyanamid Permatons	lb.	1.35	
Du Pont	lb.	2.75	
Monsanto Orange 68187	lb.	2.90	
Stan-Tone			
Light orange D-7003	lb.	4.06 /	4.26
70 PCO3	lb.	2.50 /	2.92
Orange 70 PCO4	lb.	2.90 /	3.32
D-7004	lb.	4.48 /	4.68
D-7104	lb.	2.10 /	2.30
Vansul masterbatch	lb.	2.00 /	2.60

Red

Antimony trisulfide	lb.	.285 /	.315
R. M. P. No. 3	lb.	.72	
Sulfur Free	lb.	.78	
Brilliant Toning Red	lb.	1.95	
Cadmium red lithopones	lb.	2.21 /	3.77
Cadmolith	lb.	1.72 /	2.20
Cyanamid	lb.	.80 /	1.60
Du Pont	lb.	1.47 /	1.90
Filo	lb.	.11	
Indian Red	lb.	.1275	
Iron oxide, comml	lb.	.06 /	.13
Lansco synthetic	lb.	.1175	
Mapico	lb.	.1425/	.145
Recco	lb.	.12	
Williams Red	lb.	.13 /	.1525
Monsanto Maroon 113	lb.	1.50	
61148	lb.	1.75	
Red 7	lb.	1.55	
41	lb.	4.40	
3501	lb.	1.15	
4004	lb.	1.50	
69191	lb.	3.38	
Autumn	lb.	1.10	
PRP-285	lb.	1.27	
S-44	lb.	1.28	
Rub-Er-Red	lb.	$0.0975	
Stan-Tone			
Light Red D-7005	lb.	5.23 /	$5.43
D-7105	lb.	2.26 /	2.46
70 PCO5	lb.	3.23 /	3.65
Red D-7006	lb.	5.52 /	5.72
D-7106	lb.	2.59 /	2.79
70 PCO6	lb.	3.63 /	4.05
Vansul masterbatch	lb.	.95 /	3.30
Venetian	lb.	.04 /	.0675

White

Antimony oxide	lb.	.27 /	.285
Burgess Iceberg	ton	50.00 /	80.00
Cryptone BT	lb.	.10 /	.11
Permolith lithopone	lb.	.08 /	.087
Titanium pigments			
Horse Head Anatase	lb.	.255 /	.27
Rutile	lb.	.275 /	.29
Rayox LW	lb.	.195 /	.205
R-110	lb.	.215 /	.225
Ti-Cal	lb.	.075 /	.0825
Ti-Pure	lb.	.195 /	.225
Titanox A, AA, A-168	lb.	.21 /	.22
C-50	lb.	.1225/	.1275
RA, -10, -50	lb.	.23 /	.24
RC	lb.	.0825/	.0875
-HT, -HTX	lb.	.08 /	.085
Unitane	lb.	.255 /	.285
Zopaque Anatase	lb.	.245 /	.27
Rutile	lb.	.205 /	.29
Zinc oxide, comml	lb.	.145 /	.1825
Azo ZZZ-11, -44, -55	lb.	.145 /	.165
20% leaded	lb.	.1505/	.1705
35% leaded	lb.	.155 /	.175
50% leaded	lb.	.1588/	.1788
Eagle AAA, lead free	lb.	.145 /	.155
5% leaded	lb.	.145 /	.155
35% leaded	lb.	.155 /	.165
50% leaded	lb.	.159 /	.169
Florence Green Seal	lb.	.1625/	.1725
Red Seal	lb.	.1575/	.1675
White Seal	lb.	.1675/	.1775
Horsehead XX-4, -78	lb.	.145 /	.155
Kadox-15, -17, -72, -515	lb.	.145 /	.155
-25	lb.	.1675/	.1775
Lehigh, 35% leaded	lb.	.155 /	.175
50% leaded	lb.	.1588/	.1788
Protox-166, -167	lb.	.145 /	.165
St. Joe, lead free	lb.	.145 /	.175
Zinc sulfide, comml	lb.	.253 /	.263
Cryptone ZS	lb.	.253 /	.273

Yellow

Cadmium yellow lithopones	lb.	1.12 /	1.15
Cadmolith	lb.	1.12 /	1.20
Cyanamid Hansa Yellow	lb.	2.10	
Du Pont	lb.	1.80 /	2.25
Filo	lb.	.10	
Iron oxide, comml	lb.	.0525/	.1175
Lansco synthetic	lb.	.1075	
Mapico	lb.	.12 /	.1275
Williams	lb.	.115 /	.1225
Monsanto Yellow 14	lb.	1.91	
10010	lb.	1.91	
BYP-282	lb.	1.21	
GA	lb.	2.45	
S-10010	lb.	1.17	
Stan-Tone			
Lemon 70 PCO1	lb.	1.77 /	2.19
D-7001	lb.	2.80 /	3.00
Medium yellow 70 PCO2	lb.	1.79 /	2.21
D-7002	lb.	2.98 /	3.18
Vansul masterbatch	lb.	.95 /	1.95
Williams Ocher	lb.	.0575/	.06

Dusting Agents

Diatomaceous silica	ton	32.00 /	48.00
Extrud-o-Lube, conc.	gal.	1.33 /	1.69
Glycerized Liquid Lubricant, concentrated	gal.	1.25 /	1.63
Latex-Lube GR	lb.	.20	
Pigmented	lb.	.1825	
R-66	lb.	.165	
Liqui-Lube	lb.	.1625	
N. T.	lb.	.1675	
Liquizinc No. 305	lb.	.30 /	.35
Lubrex	lb.	.25 /	.30
Mica Concord	lb.	.075 /	.0825
Mineralite	ton	45.00	
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Talc, comml	ton	18.40 /	38.50
EM	ton	11.00 /	63.00
LS Silver	ton	29.25	
Nytals	ton	25.00 /	36.00
Sierra Sagger 7	ton	34.00	
White IR	ton	19.75	
III	ton	20.75	
Vanfre	gal.	2.00	

Extenders

BRS 700	lb.	.02 /	.0285
BRT 7	lb.	.03 /	.031
Cumar Resins	lb.	.065 /	.17
Dielex B	lb.	.06	
Factice, Amberex	lb.	.29 /	.36
Brown	lb.	.1425/	.263
Neophax	lb.	.157 /	.268
White	lb.	.144 /	.285
G. B. Asphaltenes	lb.	.097 /	.177
Millex, W	lb.	.07	
Mineral Rubbers			
Black Diamond	ton	38.00 /	40.00
Hard Hydrocarbon	ton	46.50 /	48.50
Hydrocarbon MR	ton	45.00 /	55.00
Parmr	ton	21.00 /	29.00
T-MR Granulated	ton	47.50 /	50.00

Nuba No. 1, 2	lb.	$0.0575/	$0.0625
3X	lb.	.0775/	.0825
OPD-101	lb.	.26	
Rubber substitute, brown	lb.	.16 /	.2572
Car-Bel-Ex A	lb.	.14	
Car-Bel-Lite	lb.	.35	
Extender 600	lb.	.1765	
White	lb.	.192 /	.2103
Stan-Shells	ton	35.00 /	73.00
Sublac Resin PX-5	lb.	.215 /	.235
Sundex 53	gal.	.12	
85	gal.	.1725	
Synthetic 100	lb.	.41	
Vistanex	lb.	.35 /	.475

Fillers, Inert

Agrashell flour	ton	50.00 /	74.00
Albacar	ton	55.00 /	75.00
Barytes, floated, white	ton	49.00 /	70.85
Off-color, domestic	ton	25.00	
No. 1	ton	55.00 /	77.50
2	ton	50.00 /	72.50
Sparmite	ton	95.00 /	117.00
Blanc fixe	ton	100.00 /	165.00
Burgess Iceberg	ton	50.00 /	80.00
Pigment #20	ton	35.00 /	60.00
#30	ton	37.00 /	60.00
HC-75	ton	12.00 /	30.00
-80	ton	14.00 /	32.00
WP #1	ton	11.00 /	16.00
Cary #200	ton	30.00 /	55.00
Citrus seed meal	lb.	.04	
Oil	lb.	.15	
Clays			
A. F. D. Filler	ton	26.50 /	100.00
Aiken	ton	14.00	
Albacar	ton	50.00 /	55.00
Aluminum Flake	ton	22.25 /	60.00
#5	ton	24.50 /	30.00
Champion	ton	14.50	
Crown	ton	14.00 /	33.00
Dixie	ton	14.00	
Franklin	ton	13.50 /	35.25
GK Soft Clay	ton	11.00	
Harwick	ton	15.50 /	55.50
Hi-White R	ton	13.50	
Hydratex R	ton	28.00	
Kaolloid	ton	10.50	
McNamee	ton	13.50	
RX-43	ton	33.00	
Natka 1200	ton	13.00	
Paragon	ton	13.50 /	31.50
Recco	ton	14.00	
Sno-Brite	ton	12.50	
Stan-Clay	ton	28.00	
Stellar-R	ton	50.00	
Suprex	ton	14.00 /	32.00
Swanee	ton	12.50	
Windsor	ton	14.00 /	30.00
DC Silica	lb.	1.45 /	1.65
Diatomaceous silica	ton	32.00 /	48.00
Flocks			
Cotton, dark	lb.	.095 /	.135
Dyed	lb.	.55 /	.60
White	lb.	.13 /	.33
Fabrifil X-24-G	lb.	.135	
X-24-W	lb.	.235	
Filfloc 6000	lb.	.33	
F-40-900	lb.	.135	
HSC #35 Silicone Emulsion	lb.	1.22 /	2.46
Kalite	ton	50.00 /	65.00
Lithopone, comml.	lb.	.075 /	.085
Astrolith	lb.	.068 /	.0675
Eagle	lb.	.0725/	.075
Permolith	lb.	.08 /	.0875
Sunolith	lb.	.075 /	.0825
Mica Concord	lb.	.075 /	.0825
Millical	ton	38.00 /	53.00
Mineralite	ton	40.00 /	60.00
Non-Fer-Al	ton	32.50 /	47.50
Purecal	ton	56.75 /	71.75
Pyrax A	ton	13.50	
W. A.	ton	16.00	
Sawdust	ton	14.00 /	35.00
Silversheen Mica	lb.	.08 /	.09
StanWhite	ton	10.50 /	13.10
Super-White Silica	ton	25.00 /	46.50
Surfex	ton	37.50 /	52.50
MM	ton	39.50 /	54.50
Suspenso	ton	35.50 /	50.50
Ti-Cal	lb.	.0675	
Valron Estersil	lb.	2.00 /	2.25
Walnut shell flours	ton	50.00 /	84.00
Whiting, limestone			
Atomite	ton	30.00	
Calcite	ton	23.00	
Calwhite	ton	20.00	
-T	ton	23.00	
Gamaco	ton	32.50	
Keystone	ton	16.00	
Laminar	ton	30.00	
No. 10 White	ton	11.00	
Omya	ton	30.00	
Paxinosa	ton	11.00 /	19.00
Snowflake	ton	17.00 /	18.00
Stonelite	ton	9.00	
Witco	ton	8.50	
York	ton	9.50	

Finishes

Apex Bright Finish #5200-E	lb.	.25	
Rubber Finish	gal.	2.50	
Black-out	gal.	4.50 /	8.00
Flocks, Rayon, colored	lb.	.90 /	1.50
White	lb.	.75 /	1.25

Also see Flocks, under Fillers, Inert

Paraflint RG and RGU Synthetic Wax	lb.	$0.15 /	$0.22
Rubber lacquer, clear	gal.	1.00 /	2.00
Shellacs, Angelo	lb.	.485 /	.7325
Vac Dry	lb.	.485 /	.57
Talc (*See Talc, under Dusting Agents*)			
Unidip	lb.	.15 /	.20
Wax, Bees	lb.	.68 /	.83
Carnauba	lb.	.57 /	1.13
Monten	lb.	.27	
No. 118, colors	gal.	.86 /	1.41
Neutral	gal.	.76 /	1.31
Van Wax	gal.	1.45 /	1.50

Latex Compounding Ingredients

Acintol D, DLR	lb.	.06 /	.075
FA #1	lb.	.065 /	.08
#2	lb.	.075 /	.09
Accelerator 552	lb.	2.25	
J-117, -302	lb.	1.00 /	1.15
-144	lb.	.15 /	.30
-307	lb.	1.10 /	1.25
-311	lb.	.60 /	.75
Aerosol, dry types	lb.	.39 /	1.20
Liquid types	lb.	.40 /	.72
Alcogum AA-16, MA-16	lb.	.20 /	.24
AK-12, PA-10	lb.	.12 /	.14
AN-6	lb.	.05 /	.075
-10	lb.	.085 /	.10
Alrosol	lb.	.41	
Amberex solutions	lb.	.1675/	.18
Antifoam J-114	lb.	3.25 /	3.45
P-242	lb.	.24 /	.35
Antioxidant J-137, -140	lb.	.55 /	.70
-139, -293	lb.	1.45 /	1.60
-182	lb.	2.00 /	2.15
-186	lb.	1.40 /	1.55
2246	lb.	1.50 /	1.53
Anti Webbing Agent J-183	lb.	.75 /	.90
-297	lb.	.27 /	.40
Aquablak B	lb.	.0975/	.1025
G	lb.	.12 /	.125
K	lb.	.12 /	.125
M	lb.	.105 /	.11
Aquarex D	lb.	.78	
G	lb.	.21	
L	lb.	.94	
MDL	lb.	.33	
ME	lb.	.80	
Aquarex NS	lb.	.60	
SMO	lb.	.50	
WAQ	lb.	.22	
Areskap 50	lb.	.30 /	.38
100, dry	lb.	.60 /	.72
Aresket 240	lb.	.30 /	.38
300, dry	lb.	.60 /	.72
Aresklene 375	lb.	.42 /	.57
Ben-A-Gels	lb.	.98 /	1.40
Bentone 18, 18C	lb.	.45	
34	lb.	.60	
Casein	lb.	.22	
Cellosize WP-09, -3, -40 -300	lb.	1.00 /	1.17
CW-12		.85	
-37	lb.	.70	
DC Antifoam A Compound	lb.	5.45 /	6.65
B	lb.	.68 /	1.20
Emulsion	lb.	2.05 /	4.00
AF Emulsion	lb.	2.05 /	2.85
Compound 7	lb.	5.13 /	6.50
Defoama W-1701	lb.	.125	
Defoamer 115a	lb.	.50	
Dispersing Agents			
Blancol	lb.	.1525/	.26
N	lb.	.155 /	.26
Darvan Nos. 1, 2, 3	lb.	.22 /	.30
Daxad 11, 21, 23, 27	lb.	.08 /	.30
Dispersaid H7A	lb.	.58	
1159	lb.	.43	
Emulphor ON-870	lb.	.50 /	.70
Igepal CO-630	lb.	.2875/	.47
Igepon T-73	lb.	.285 /	.495
T-77	lb.	.45 /	.69
Indulins	lb.	.06 /	.08
Kreelons	lb.	.132 /	.155
Laurelton Oil	lb.	.18	
Leonil SA	lb.	.52 /	.65
Lomar PW	lb.	.18	
Marasperse CB	lb.	.1225/	.1425
N	lb.	.095 /	.105
Modicols	lb.	.17 /	.58
Nekal BA-75	lb.	.395 /	.54
BX-76	lb.	.63 /	.75
Orzan A	lb.	.0325	
S	lb.	.0425	
Pluronics	lb.	.335 /	.40
Polyfons	lb.	.08 /	.09
Sorapon SF-78	lb.	.28 /	.40
Tergitol NPX	lb.	.275 /	.3074
TMN	lb.	.2875/	.32
7	lb.	.4125/	.44
Trenamine W-30	lb.	.15	
W-40	lb.	.60 /	.75
Triton R-100	lb.	.12 /	.25
X-100, -102, -114	lb.	.255 /	.36
Dispersions			
Agebest 1293-22	lb.	1.90 /	2.00
AgeRite Alba	lb.	3.00	
Powder, Resin D	lb.	.80	
White	lb.	1.80	
Altax	lb.	.75	
Shield Nos. 2, 6	lb.	.08	
3	lb.	.095	
4-35	lb.	.09	
5	lb.	.093	
7-F, 8	lb.	.165	
55	lb.	.18	
Iron Oxide, 60%	lb.	.40	
L.S.W.	lb.	$1.50	
No. 305 Liquizinc	lb.	.30 /	$0.35
P-33	lb.	.35	
Rotax	lb.	.75	
Sulfur	lb.	.12 /	.30
No. 2	lb.	.14 /	.16
Telloy	lb.	3.00	
Tuads, Methyl	lb.	1.60	
Vulcacure NB	lb.	.45	
NS	lb.	.75 /	1.05
ZB, ZE, ZM	lb.	.85 /	.89
Vulcanizing, C group	lb.	.40 /	1.30
G group	lb.	.45 /	.90
N group	lb.	.40 /	1.00
Vulcafoams	lb.	.40 /	.70
Vulcanols	lb.	.75 /	.80
Zetax	lb.	.75	
Zimates, Butyl	lb.	1.30	
Ethyl, Methyl	lb.	1.35	
Zinc oxide	lb.	.40	
Emulsions			
AgeRite Stalite	lb.	.75	
Borden Arcco A-25, A-26, 716-30	lb.	.18 /	.19
555-40-R	lb.	.185 /	.205
620-32B	lb.	.20 /	.21
716-35	lb.	.17 /	.18
1041-21	lb.	.165 /	.175
Habuco Resin Nos. 502, 515, 523	lb.	.195 /	.20
503	lb.	.22 /	.225
504, 526	lb.	.19 /	.195
517	lb.	.175 /	.18
524	lb.	.155 /	.16
Resin A-2	lb.	.16 /	.25
P-370	lb.	.175 /	.25
X-210	lb.	.12 /	.22
Freeze-Stabilizer 322	lb.	.40	
12116C	lb.	.52	
Igepon T-43	lb.	.145 /	.35
T-51	lb.	.125 /	.285
-73	lb.	.285 /	.495
Ludox	lb.	.1675/	.195
Marmix	lb.	.41 /	.48
Merac	lb.	.75 /	1.05
Micronex, colloidal	lb.	.06 /	.072
Monsanto Blue 4685 WD	lb.	1.60	
Green 4884 WD	lb.	1.80	
Red 127	lb.	1.25	
OPD 101	lb.	.16 /	.26
Picco Latex Plasticizer A-12	lb.	.069 /	.096
Pliolite Latex 150, 190	lb.	.32 /	.41
170	lb.	.37 /	.46
Polyvinyl methyl ether	lb.	.25 /	.45
Resin V	lb.	.13	
Roelgel 100C	lb.	.46	
Santomerse D	lb.	.44 /	.65
S	lb.	.13 /	.25
Sellogen Gel	lb.	.1275	
Sequestrene AA	lb.	.905 /	.975
30A	lb.	.245 /	.265
ST	lb.	.585 /	.615
Setsit #5	lb.	.75 /	1.05
Stablex A	lb.	.80 /	1.10
B, G	lb.	.50 /	.95
K	lb.	.27 /	.35
Stablex P	lb.	.35 /	.50
T	lb.	.14 /	.22
Surfactol 13	lb.	.345 /	.36
Webnix	lb.	1.50 /	2.50

Mold Lubricants

Acintol D	lb.	.06 /	.075
A-C Polyethylene	lb.	.30 /	.37
Alipal CO-433	lb.	.25 /	.45
CO-436	lb.	.22 /	.41
Aquarex Compounds	lb.	.21 /	.94
Carbowax 200, 300, 400	lb.	.22 /	.25
1500	lb.	.255 /	.2825
4000	lb.	.31 /	.32
6000	lb.	.35 /	.36
Castorwax	lb.	.3375/	.3575
Colite Concentrate	gal.	.90 /	1.15
D-Tak Dip #10	gal.	1.50	
DC Mold Release Fluid	lb.	3.14 /	4.75
Compound 4, 7	lb.	5.13 /	6.50
Emulsion 7	lb.	1.59 /	2.07
8, 35, 35A, 35B, 36	lb.	1.22 /	1.76
200 Fluid	lb.	3.14 /	4.75
ELA	lb.	.82	
FT Wax 200	lb.	.265 /	.42
300	lb.	.295 /	.45
Glycerized Liquid Lubricant, concentrated	gal.	1.25 /	1.63
Igepals	lb.	.2375	.74
Igepon AP-78	lb.	.44 /	.68
T-43	lb.	.145 /	.35
-51	lb.	.125 /	.285
-73	lb.	.285 /	.495
Lubrex	lb.	.27 /	.32
Lubri-Flo	gal.	10.00 /	12.05
Lustermold	lb.	.41	
L-41 Diethyl Silicone Oil	lb.	3.50	
Mold Paste	lb.	.25	
Monopole Oil	lb.	.16	
Monten Wax	lb.	.57	
Para Lube	lb.	.046 /	.048
Paraflint RG and RGU Synthetic Wax	lb.	.15 /	.22
Plaskon 8406, 8407	lb.	.30 /	.37
8416, 8417	lb.	.35 /	.42
8429	lb.	.40 /	.47
Pluronics	lb.	.335 /	.44
Poly-Brite PE-200	lb.	.28 /	.42
600	lb.	.42 /	.58
Poly-Cone 125X	lb.	1.22 /	1.40
1000	lb.	.94 /	1.06
Polyglycol E series	lb.	.29 /	.42

RA-1, -2, -3	gal.	$2.25 /	$3.00
Rubber Glo	gal.	.94 /	.97
SM-33, -55, -61, -62	lb.	1.22 /	1.76
Soap, Hawkeye	lb.	1.35 /	1.45
Purity	lb.	.155 /	.165
Sodium stearate	lb.	.40	
Stoner's 700 series	gal.	1.20 /	1.25
800 series	gal.	1.26 /	1.70
900 series	gal.	1.55 /	2.55
A Series	gal.	1.80 /	4.50
Ucon 50-HB Series	lb.	.25 /	.375
Ulco	lb.	.12 /	.23
Vanfre	gal.	2.50 /	3.00

Odorants

Alamasks	lb.	.75 /	6.50
Coumarin	lb.	2.95 /	3.55
Curodex 19	lb.	4.75 /	5.05
188	lb.	5.75	
198	lb.	5.75	
Ethavan	lb.	6.75 /	7.35
Latex Perfume #7	lb.	4.00	
Neutroleum Gamma	lb.	3.60	
Rubber Perfume #10	lb.	2.60	
Vanillin, Monsanto	lb.	3.00 /	3.15

Plasticizers and Softeners

Acintol R	lb.	.065 /	.07
Adipol 2EH, 10A	lb.	.40 /	.435
BCA	lb.	.43 /	.455
ODY	lb.	.43 /	.465
Admex 710	lb.	.325	
711	lb.	.345	
744	lb.	.40	
Aro Lene #1980	lb.	.10 /	.12
Baker AA Oil	lb.	.195 /	.24
Crystal O Oil	lb.	.21 /	.255
Processed oils	lb.	.215 /	.235
Bardol, 639	lb.	.215 /	.235
B	lb.	.0625/	.065
Benzoflex 2-45	lb.	.26 /	.29
9-88	lb.	.27 /	.30
Bondogen	lb.	.55 /	.60
BRC 20	lb.	.15 /	.175
22	lb.	.025 /	.0275
30	lb.	.0125/	.021
521	lb.	.019 /	.02
BRH 2	lb.	.0213/	.0351
BRS 700	lb.	.02 /	.0285
BRT 7	lb.	.03 /	.031
BRV	lb.	.0475/	.0565
Bunarex Liquid	lb.	.0425/	.0555
Resins	lb.	.065 /	.1225
Bunnatol G, S	lb.	.40 /	.505
Butac	lb.	.125 /	.135
Butyl stearate, comml.	lb.	.255	
Binney & Smith	lb.	.23 /	.26
Hardesty	lb.	.23 /	.26
Ohio-Apex	lb.	.245 /	.255
Cabflex HS-10	lb.	.44 /	.47
G. P.	lb.	.0125/	.02
R-100	lb.	.045 /	.0525
TT	lb.	.017 /	.0245
Califlux G. P.	lb.	.015 /	.0225
R-100	lb.	.0475/	.0575
T-T	lb.	.019 /	.0295
510, 550	lb.	.0275/	.0375
Capryl alcohol, comml.	lb.	.195 /	.235
Binney & Smith	lb.	.18 /	.28
Hardesty	lb.	.18 /	.28
Chlorowax 40	lb.	.1625/	.1825
70	lb.	.185 /	.245
S	lb.	.21 /	.27
Circo light	gal.	.17	
Circosol-2XH	gal.	.185	
Contogums	lb.	.0875/	.111
Cumar Resins	lb.	.065 /	.17
DBM (dibutyl-m-cresol)			
Darax	lb.	.32 /	.3475
DBP (dibutyl phthalate), comml.	lb.	.30 /	.133
Darex	lb.	.30 /	.33
Eastman	lb.	.30 /	.33
Harwick Std. Chem. Co.	lb.	.325 /	.385
Hatco	lb.	.30 /	.33
Monsanto	lb.	.30 /	.33
Naugatuck	lb.	.30 /	.33
Ohio-Apex	lb.	.30 /	.335
PX-104	lb.	.30 /	.33
Rubber Corp. of America	lb.	.30 /	.44
Sherwin-Williams	lb.	.30 /	.33
DBS (dibutylsebacate) comml.	lb.	.66 /	.69
Hatco	lb.	.66 /	.685
Monoplex	lb.	.66 /	.675
Naugatuck	lb.	.665 /	.69
PX-404	lb.	.665 /	.69
DCP (dicaprylphthalate), comml.	lb.	.295 /	.325
Hatco	lb.	.295 /	.325
Monoplex	lb.	.30 /	.315
DDA (didecyladipate)			
Cabflex	lb.	.425 /	.455
Good-rite GP-236	lb.	.40 /	.55
DDP (didecylphthalate)			
Cabflex	lb.	.305 /	.335
Good-rite GP-266	lb.	.295 /	.45
Hatco	lb.	.305 /	.435
Defoamer X-3	lb.	.355	
DIBA (diisobutyladipate)			
Cabflex	lb.	.4325/	.4625
Darex	lb.	.4325/	.4625
Eastman	lb.	.41 /	.44
Ohio-Apex	lb.	.41 /	.445
DIDA (diisodecyladipate)			
Monsanto	lb.	.425 /	.455
DIDP (diisodecylphthalate)			
Darex	lb.	$0.32 /	$0.35
Monsanto	lb.	.305 /	.335
Ohio-Apex	lb.	.295 /	.325
PX-120	lb.	.305 /	.335
Dielex B	lb.	.06	
Diethylene glycol, comml.	lb.	.1525/	.1825
Wyandotte	lb.	.15 /	.165
Dinopol IDO	lb.	.285 /	.32
DIOA (diisooctyladipate)			
Cabflex	lb.	.425 /	.455
Naugatuck	lb.	.435 /	.465
PX-208	lb.	.425 /	.455
Rubber Corp. of America	lb.	.425 /	.56
DIOP (diisooctylphthalate), comml.	lb.	.305 /	.335
Cabflex	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Eastman	lb.	.305 /	.335
Hatco	lb.	.305 /	.335
Monsanto	lb.	.305 /	.335
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.28 /	.315
PX-108	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Sherwin-Williams	lb.	.32 /	.34
DIOS (diisooctylsebacate), comml.	lb.	.61 /	.64
Rubber Corp. of America	lb.	.61 /	.84
DIOZ (diisooctylazelate)			
Cabflex	lb.	.48 /	.51
Dipolymer Oil	gal.	.33 /	.38
Dispersing Oil No. 10	lb.	.06 /	.0625
DNODP (di-n-octyl-n-decyl phthalate), Monsanto	lb.	.345 /	.375
DOA (dioctyladipate), comml.	lb.	.425 /	.455
Cabflex	lb.	.425 /	.455
Eastman	lb.	.40 /	.43
Good-rite GP-233	lb.	.40 /	.55
Hatco	lb.	.435 /	.465
Monsanto	lb.	.425 /	.455
Naugatuck	lb.	.435 /	.465
PX-238	lb.	.425 /	.455
Rubber Corp. of America	lb.	.425 /	.56
DOP (dioctylphthalate), comml.	lb.	.305 /	.335
Cabflex	lb.	.305 /	.335
Darex	lb.	.32 /	.35
Eastman	lb.	.305 /	.335
Good-rite GP-261	lb.	.285 /	.44
Hatco	lb.	.305 /	.335
Monsanto	lb.	.305 /	.335
Naugatuck	lb.	.305 /	.335
Ohio-Apex	lb.	.28 /	.315
Polycizer 162	lb.	.28 /	.435
PX-138	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Sherwin-Williams	lb.	.305 /	.335
DOS (dioctylsebacate), comml.	lb.	.61 /	.64
Eastman	lb.	.61 /	.64
Hatco	lb.	.61 /	.635
Monoplex	lb.	.61 /	.635
Naugatuck	lb.	.615 /	.64
PX-438	lb.	.615 /	.64
Rubber Corp. of America	lb.	.61 /	.84
Drapex 3.2	lb.	.40 /	.54
Dutch Boy NL-A10 (DBP)	lb.	.30 /	.33
-A20 (DOP), A30 (DIOP)	lb.	.305 /	.335
-A54	lb.	.295 /	.325
-C20 (DOS)	lb.	.61 /	.63
-F21	lb.	.395 /	.425
-F31	lb.	.44 /	.47
-F41	lb.	.48 /	.51
Dutrex 6	lb.	.025 /	.035
Dymerex Resin	lb.	.135 /	.1475
Emulphor EL-719	lb.	.52 /	.73
Endor	lb.	.65	
Ethox	lb.	.43 /	.455
Ethylene glycol, comml.	lb.	.135 /	.165
Wyandotte	lb.	.1325/	.1425
Flexol 3 GH	lb.	.44 /	.46
3 GO	lb.	.53 /	.55
4 GO	lb.	.325 /	.355
10-A	lb.	.425 /	.455
426	lb.	.27 /	.30
810, 810X, 10-10, 10-10X	lb.	.305 /	.335
TOF, A-26	lb.	.435 /	.465
Flexricin P-4	lb.	.3475/	.3625
P-6	lb.	.415 /	.43
P-8	lb.	.3475/	.3625
PG-16	lb.	.335 /	.35
Fortex	lb.	.125 /	.145
G. B. Asphaltic Flux	gal.	.097 /	.177
Naphthenic Neutrals	gal.	.125 /	.215
Process oil, light	lb.	.0275/	.0375
Medium	lb.	.0375/	.0475
Galex W-100	lb.	.155 /	.18
W-100 D	lb.	.1525/	.1775
Gilsowax B	lb.	.0975/	.11
Harchemex	lb.	.24 /	.345
Harflex	lb.	1.25 /	1.335
40	lb.	.64 /	.725
50, 80, 300	lb.	.58 /	.665
60	lb.	.62 /	.705
90	lb.	.88 /	.965
120, 150	lb.	.305 /	.395
140, 160	lb.	.30 /	.33
180	lb.	.295 /	.38
220, 250	lb.	.425 /	.515
260	lb.	.42 /	.45
280	lb.	.42 /	.51
500	lb.	.315 /	.41
HB-20	lb.	.15 /	.17
-40	lb.	.19 /	.21
Heavy Resin Oil	lb.	.0225/	.0375
HSC-13	lb.	.25 /	.32
-39	lb.	.22 /	.29
Hycar 1312	lb.	$0.60	
Indonex	gal.	.11 /	$0.195
Kapsol	lb.	.33 /	.35
Kenflex A, L	lb.	.26 /	.27
B	lb.	.23 /	.24
N	lb.	.18 /	.19
Kessoflex 103	lb.	.405	
105	lb.	.3325	
106	lb.	.38	
107	lb.	.525	
110	lb.	.24	
111	lb.	.28	
KP-23	lb.	.29 /	.325
-90	lb.	.40 /	.435
-140	lb.	.46 /	.485
-201	lb.	.58 /	.59
-220	lb.	.32 /	.355
-555	lb.	.565 /	.57
Kronisol	lb.	.33 /	.365
Kronitex AA, I, K-3, Mx	lb.	.325 /	.36
LX-685, -125, -135	lb.	.125 /	.135
Marvinol plasticizers	lb.	.28 /	.8825
Methox	lb.	.385 /	.41
Monoplex S-38	lb.	.215 /	.24
S-71	lb.	.45 /	.475
Morflex	lb.	.25 /	.65
Natac	lb.	.12 /	.13
Neoprene Peptizer P-12	lb.	1.05	
Nevillac	lb.	.31 /	.85
Neville R Resins	lb.	.145 /	.205
Nevinol	lb.	.24	
No. 1-D heavy oil	lb.	.065	
ODA (octyldecyladipate)			
Cabflex	lb.	.425 /	.455
Good-rite GP-235	lb.	.40 /	.55
ODP (octyldecylphthalate)			
Cabflex	lb.	.305 /	.335
Good-rite GP-265	lb.	.29 /	.445
Hatco	lb.	.305 /	.335
Rubber Corp. of America	lb.	.305 /	.45
Ohopex Q-10	lb.	.295 /	.33
R-9	lb.	.3525/	.3775
Orthonitro benzophenol, comml.	lb.	.13 /	.15
Monsanto	lb.	.13 /	.15
Palmalene	lb.	.15	
Panaflex BN-1	lb.	.185 /	.225
Para Flux, regular	gal.	.10 /	.2125
No. 2016	gal.	.165 /	.24
2332	gal.	.11	
4205	lb.	.1075/	.2125
Para Lube	lb.	.046 /	.048
Resins	lb.	.04 /	.045
Paradene Resins	lb.	.07 /	.08
Paraplex 5-B	lb.	.29 /	.3475
Al-111	lb.	.32 /	.3275
G-25	lb.	.76 /	.77
-40	lb.	.4825/	.51
-50	lb.	.39 /	.4175
-53	lb.	.4325/	.46
-60	lb.	.325 /	.35
-62	lb.	.345 /	.37
RG-7	lb.	.33 /	.335
-8	lb.	.505 /	.5125
-10	lb.	.52 /	.5275
Pepton 22	lb.	.83 /	.86
65	lb.	1.23 /	1.26
65-B	lb.	.83 /	.86
Philrich 5	gal.	.11	
Picco Resins	lb.	.135 /	.195
480 Oilproof Series	lb.	.18 /	.23
Aromatic Plasticizers	lb.	.05 /	.065
Liquid Resin D-165 (Y)	lb.	.06 /	.075
(Z-3)	lb.	.07 /	.085
(Z 6)	lb.	.08 /	.095
S. O. S.	gal.	.29 /	.34
Piccocizers	lb.	.04 /	.055
Piccolastic Resins	lb.	.1855/	.34
Piccolyte Resins	lb.	.205 /	.245
Piccopale Resins	lb.	.12 /	.135
Piccovars	lb.	.165 /	.20
Piccovol	lb.	.025 /	.038
Pictar	gal.	.25 /	.30
Pigmentar	lb.	.046 /	.0745
Pigmentaroil	lb.	.046 /	.0745
Pine Tar, Sunny South	lb.	.046 /	.0801
Oil, Sunny South	lb.	.046 /	.0801
Pitch, Burgundy, Sunny South	lb.	.1030/	.1085
Plasticizers			
42	lb.	.34 /	.40
B	lb.	.35 /	.45
DP-520	lb.	.435 /	.455
MP	lb.	.035 /	.0755
MT-511	lb.	.6925/	.7425
ODN	lb.	.35 /	.475
SC	lb.	.40 /	.515
Plastoflex #3	lb.	.52 /	.57
#520	lb.	.36 /	.435
DBE	lb.	.50 /	.55
MGB	lb.	.29 /	.37
SP-2	lb.	.43 /	.48
VS	lb.	.3575/	.3975
Plastogen	lb.	.0775/	.08
Plastone	lb.	.25 /	.32
Polycin 470	lb.	.325 /	.34
Polycizers	lb.	.28 /	.55
162	lb.	.285 /	.44
Polymel C-128	lb.	.1775/	.1875
D	lb.	.225 /	.235
D-TAC	lb.	.1975/	.215
DX, C-130	lb.	.1375/	.1475
Poly-Sperse AP-2	lb.	.23 /	.295
AP-300	lb.	.26 /	.325
LC-20	lb.	.26 /	.325
PT67 Light Pine Oil	gal.	.60	
101 Pine Tar Oil	lb.	.046 /	.0634
Pine Tars	lb.	.046 /	.0634
Reogen	lb.	.1325/	.135

Resin C pitch	lb.	$0.0225/	$0.031
R6-3	lb.	.38 /	.40
Resinex 10, 25, 50, 110	lb.	.04 /	.045
70	lb.	.0325/	.0375
85, 100	lb.	.035 /	.04
115	lb.	.0375/	.0425
L-2, L-3, L-4, L-5	lb.	.0225/	.03
Rosin Oil, Sunny South	gal.	.58 /	.875
RPA No. 2	lb.	.82	
3	lb.	.48	
Conc.	lb.	.85	
5	lb.	.68	
6	lb.	1.62	
RSN Flux	gal.	.10 /	.91
Rubber Oil B-5	lb.	.0225/	.0355
Rubberol	lb.	.18 /	.2725
Santicizer 1-H	lb.	.50 /	.51
3	lb.	.46 /	.47
8	lb.	.43 /	.44
9	lb.	.39 /	.42
140	lb.	.325 /	.36
141	lb.	.34 /	.37
160	lb.	.25 /	.28
601	lb.	.325	
602	lb.	.305	
B-16	lb.	.4875/	.4975
E-15	lb.	.5075/	.5375
Santocizer	lb.	.4275/	.4575
Sebacic acid, purified,			
comml.	lb.	.59 /	.65
Binney & Smith	lb.	.64 /	.76
Hardesty	lb.	.64 /	.76
C. P.- Binney & Smith	lb.	.72 /	.84
Hardesty	lb.	.72 /	.84
Sherolatum Petroleum	lb.	.05 /	.10
Softener #20	gal.	.10 /	.20
Special Rubber Resin 100	lb.	.1675/	.2175
Staflex AX	lb.	.43	
DBES	lb.	.61 /	.635
Syn-Tac	gal.	.33 /	.35
Synthol	lb.	.17 /	.2625
Thiokol TP-90B	lb.	.59	
-95	lb.	.65	
Tricresyl phosphate, comml.	lb.	.33 /	.36
Cabflex	lb.	.345 /	.375
Monsanto	lb.	.325 /	.36
Naugatuck	lb.	.33 /	.36
PX-917	lb.	.33 /	.36
Triphenyl phosphate,			
comml.	lb.	.39 /	.40
Monsanto	lb.	.39 /	.40
Turgum S	lb.	.1075/	.1175
Tysonite	lb.	.24 /	.2475
United	gal.	.69 /	1.20
X-1 Resinous Oil	lb.	.0225/	.0325

Reclaiming Oils

Acintol C, P	lb.	.02 /	.03
Bardol, 639	lb.	.0275/	.0375
B	lb.	.0625/	.065
BRH 2	lb.	.0213/	.0351
BRT 3	lb.	.018 /	.0265
4	lb.	.025 /	.026
7	lb.	.03 /	.031
BRV	lb.	.0475/	.0565
Burco-RA	lb.	.053 /	.0805
BWH-1	lb.	.16 /	.18
Dipolymer Oil	gal.	.33 /	.43
Dispersing Oil No. 10	lb.	.06 /	.0625
G. B. Oils	gal.	.115 /	.275
Heavy Resin Oil	lb.	.0225/	.0375
LX-572	gal.	.27 /	.32
-759	gal.	.1375	
-777, -809, -859	gal.	.23 /	.33
-869	gal.	.33 /	.43
-871	gal.	.34 /	.44
No. 3186	gal.	.28 /	.295
Picco 6535	gal.	.25 /	.30
C-33	gal.	.215 /	.315
-42	gal.	.23 /	.33
D-4	gal.	.27 /	.37
E-5	gal.	.25 /	.35
Q-Oil	gal.	.286 /	.36
PT 67	gal.	.60	
101 Pine Tar Oil	lb.	.0427/	.061
150 Pine Solvent	gal.	.44	
Reclaiming Oil #3186	gal.	.28 /	.385
-G	gal.	.25 /	.365
4039-M	gal.	.3275/	.3975
-Y	gal.	.30 /	.37
RR-10	lb.	.37	
S. R. O.	lb.	.015 /	.0225
X-1 Resinous Oil	lb.	.0225/	.0325

Reinforcers, Other Than Carbon Black

Angelo Shellacs	lb.	.485 /	.7325
Borden, Chem. Div.			
Arcco 978-42B	lb.	.18 /	.19
1073-18B	lb.	.135 /	.145
1294-36B	lb.	.115 /	.125
1301-12B	lb.	.15 /	.16
BRC 20	lb.	.15 /	.175
22	lb.	.025 /	.0275
30	lb.	.0125/	.021
521	lb.	.019 /	.02
Bunarex Resins	lb.	.065 /	.1225
Cab-o-sil	lb.	.68 /	.75
Calcene NC	ton	72.50 /	92.50
TM	ton	75.00 /	95.00
Calco S. A.	lb.	.85 /	.88
Clays			
Aiken	ton	14.00	
Aluminum Flake	ton	22.25 /	60.00
Buca	ton	45.00	
Burgess Iceberg	ton	50.00 /	80.00
Icecap K	ton	65.00 /	90.00
Pigment #20	ton	35.00 /	60.00
#30	ton	37.00 /	60.00

CALENDAR of COMING EVENTS

November 20-21

Commercial Chemical Development Assn. and Chemical Market Research Assn. Joint Meeting, Shamrock Hilton Hotel, Houston, Tex.

December 1-6

American Society of Mechanical Engineers. Annual Meeting. Hotel Statler, New York, N. Y.

December 2-6

Exposition of Chemical Industries. Coliseum, New York, N. Y.

December 3

Buffalo Rubber Group. Christmas Party. Town Casino, Buffalo, N. Y.

December 3-5

Sixth Annual Wire & Cable Symposium. U. S. Army Signal Engineering Laboratories and Industry Berkeley-Carteret Hotel, Asbury Park, N. J.

December 5

Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

December 6

Detroit Rubber & Plastics Group, Inc. Christmas Party.

Northern California Rubber Group.

December 10-11

Plastics Film, Sheeting & Coated Fabrics Division, SPI. Conference. Hotel Commodore, New York, N. Y.

December 13

Boston Rubber Group. Christmas Party. Hotel Somerset, Boston, Mass.

Chicago Rubber Group.

The Los Angeles Rubber Group, Inc. Christmas Party. Ambassador Hotel, Los Angeles, Calif.

New York Rubber Group. Christmas Party. Latin Quarter, New York, N. Y.

December 14

Southern Ohio Rubber Group.

January 7

The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

January 24

Akron Rubber Group. Sheraton-Mayflower, Akron, O.

January 27-30

Plant Maintenance and Engineering Show and Conference. International Amphitheatre, Chicago, Ill.

February 4

The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

February 10-14

American Society for Testing Materials, Committee Week. Hotel Statler, St. Louis, Mo.

February 13

Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

March 4

The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

April 1

The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

April 10

Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

April 11

Akron Rubber Group. Spring Meeting.

April 13-18

American Chemical Society. National Meeting. San Francisco, Calif.

April 20-23

American Institute of Chemical Engineers and The Chemical Institute of Canada. Chemical Engineering Conference. Montreal, P.Q., Canada.

May 6

The Los Angeles Rubber Group, Inc. Biltmore Hotel, Los Angeles, Calif.

May 12-14

Eighth Canadian High Polymer Forum. National Research Council of Canada and Chemical Institute of Canada. MacDonald College, Quebec, P.Q., Canada.

May 13-16

Division of Rubber Chemistry, American Chemical Society. Netherlands-Plaza Hotel, Cincinnati, O.

June 6

Fort Wayne Rubber & Plastics Group. Summer Outing.

June 20

Akron Rubber Group. Summer Outing.

September 7-12

American Chemical Society. Chicago, Ill.

September 9-12

Division of Rubber Chemistry, ACS. Hotel Sherman, Chicago, Ill.

September 25

Fort Wayne Rubber & Plastics Group. Van Orman Hotel, Fort Wayne, Ind.

November 17-21

Eighth National Plastics Exposition. Society of the Plastics Industry. International Amphitheatre, Chicago, Ill.

National Plastics Conference, Hotel Morrison, Chicago.

Catalpo	ton	$35.00	
Crown	ton	14.00	$33.00
Dixie	ton	14.00	
Franklin	ton	13.50	35.25
L. G. B.	ton	17.00	
Paragon	ton	13.50	33.00
Pigment No. 33	ton	37.00	
Recco	ton	14.00	
Suprex	ton	14.00	33.50
Swanee	ton	12.50	
Whitetex	ton	50.00	
Windsor	ton	14.00	30.00
Witco No. 1	ton	14.00	30.00
No. 2	ton	13.50	30.00
Clearcarb	lb.	.1175	.1255
Cumar Resins	lb.	.065	.17
Darex Resins	lb.	.42	.49
DC Silica	lb.	1.45	1.65
Diatomaceous silica	ton	32.00	48.00
Good-rite 2007		.36	.38
2057		.30	.31
K Series Polymers	lb.	.15	.37
Hi-Sil 101	lb.	.14	.155
233	lb.	.08	.095
X303	lb.	.40	.45
Hycar 2001	lb.	.55	
2007	lb.	.39	
Indulins	lb.	.06	.08
Kralac A-EP	lb.	.43	.54
Laminar	ton	30.00	
Magnesium carbonate, Marinco CL	lb.	.105	.135
Marbon Resins	lb.	.36	.43
Multifex MM	ton	110.00	125.00
Super	ton	160.00	175.00
Neville Resins			
465	lb.	.075	.08
LX-509	lb.	.33	.35
Nebony	lb.	.045	.05
Paradene	lb.	.07	.08
R	lb.	.145	.205
Para Resins 2457, 2718	lb.	.04	.4575
Parapol S-Polymers	lb.	.44	
Picco Resins	lb.	.13	.225
Piccolyte Resins	lb.	.205	.275
Piccoumaron Resins	lb.	.07	.19
Piccovars	lb.	.145	.20
Pliolite NR types	lb.	.98	1.33
S-3	lb.	.42	.49
S-6	lb.	.36	.43
-6B	lb.	.36	.43
Plio-Tuf G85C	lb.	.52	.59
Purecal M	ton	56.75	71.75
SC, T	ton	110.00	125.00
U	ton	120.00	135.00
R-B-H 510	lb.	.15	.22
Resinex	lb.	.0225	.1025
Rubber Resin LM-4	lb.	.28	.35
Silene EF	ton	120.00	140.00
Silvacons	ton	55.00	85.00
Transphalt	lb.	.0225	.0525
Witcarb R	ton	105.00	120.00
-12	ton	45.00	66.00
Zeolex 23	ton	120.00	140.00
Zinc oxide, commercial†	lb.	.135	.1775

Retarders

Benzoic acid TBAO-2	lb.	.44	
E-S-E-N	lb.	.37	.39
Good-rite Vultrol	lb.	.62	.66
R-17 Resin	lb.	.1075	.36
Retarder ASA	lb.	.57	
J	lb.	.62	.64
PD	lb.	.39	.41
W	lb.	.42	
Retardex	lb.	.47	.50
Thionex	lb.	1.14	
Wiltrol P	lb.	.37	.39

Solvents

Bondogen	lb.	.55	.60
Butyrolactone	lb.	.60	.65
Cosol #1	gal.	.37	.43
#2	gal.	.42	.48
Dichloro Pentanes	lb.	.04	.07
Dipentene DD, Sunny South	gal.	.40	.62
Ethylene dichloride, comml.	lb.	.09	.122
Hi-Flash 2-50-W	gal.	.41	
Pale yellow	gal.	.39	
LX-572	gal.	.27	.32
-748	gal.	.16	.23
Methyl-2-pyrrolidone	lb.	.75	.80
Neville Nos. 100, 104	gal.	.52	.60
106	gal.	.38	.46
Nevsolv H, 200	gal.	.19	.29
HF, T, 30	gal.	.24	.34
Penetrell	gal.	.40	.62
Picco Hi-Solv Solvents	gal.	.16	.48
Pine Oil DD, Sunny South	lb.	.1225	.1425
PT 150 Pine Solvent	gal.	.44	
Skellysolve-B	gal.	.17	
-H	gal.	.148	
-R, -V	gal.	.139	
-C	gal.	.162	
Stauffer Carbon Disulfide	lb.	.0525	.085
Tetrachloride	lb.	.0825	.475

Tackifiers

Acintol R	lb.	.065	.07
Bardol, 639	lb.	.0275	.0375
Borden, Arcco			
A25, A26, 716-30	lb.	.18	.19
555-40R	lb.	.185	.205
620-32B	lb.	.20	.21
716-35	lb.	.17	.18
1041-21	lb.	.165	.175

BRH 2	*lb.*	$0.0213/	$0.0351
Bunarex Resins	*lb.*	.065 /	.1225
Chlorowax 70	*lb.*	.18 /	.24
Contogums	*lb.*	.0875/	.11
Cumar Resins	*lb.*	.065 /	.17
Galex W-100	*lb.*	.155 /	.17
W-100D	*lb.*	.1525/	.1625
Indopol H-35	*gal.*	.65 /	.81
H-50	*gal.*	.70 /	.86
-100	*gal.*	.85 /	1.05
-300	*gal.*	1.00 /	1.21
L-10	*gal.*	.40 /	.56
-50	*gal.*	.45 /	.61
-100	*gal.*	.55 /	.71
Kenflex resins	*lb.*	.18 /	.27
Koresin	*lb.*	.90 /	1.10
Natac	*lb.*	.12 /	.13
Nevindene	*lb.*	.15 /	.18
Picco Resins	*lb.*	.13 /	.185
Piccolastic Resins	*lb.*	.1855/	.34
Piccolyte Resins	*lb.*	.185 /	.25
Piccopale Resins	*lb.*	.089 /	.13
Piccoumaron Resins	*lb.*	.07 /	.185
R-B-H 510	*lb.*	.15 /	.22
Roelflex 1118A	*lb.*	.39	
Synthetic 100	*lb.*	.41	
Synthol	*lb.*	.17 /	.2625
United	*gal.*	.69 /	1.20

Vulcanizing Agents

Dibenzo G-M-F	*lb.*	2.60	
G-M-F #113, #117	*lb.*	.90	
HMDA-Carbamate	*lb.*	4.50 /	4.90
Ko-Blend I, S	*lb.*	.39	
Litharge (*See Accelerator-Activators, Inorganic*)			
Magnesium oxide	*lb.*	.2525/	.38
Maglite D, K	*lb.*	.2575/	.285
M	*lb.*	.2975/	.325
Red Lead (*See Accelerator-Activators, Inorganic*)			
Sulfasan R	*lb.*	1.55 /	1.57
Sulfur flour. comml.	100 *lbs.*	2.55 /	3.30
Aero	100 *lbs.*	2.40 /	7.75
Crystex	*lb.*	.195 /	.23
Insoluble 60	*lb.*	.125 /	.13
Rubbermakers	100 *lbs.*	2.65 /	4.55
Stauffer	*lb.*	.0265/	.054
Telloy	*lb.*	2.50	
VA-7	*lb.*	.50 /	.60
Vandex	*lb.*	15.50	
Vultac No. 2	*lb.*	.47 /	.755
3	*lb.*	.51 /	.795
White lead silicate (*See Accelerator-Activators, Inorganic*)			

Nigeria

(Continued from page 316)

most doubled in the last two years. In 1956 exports were 38.122 tons, 8,000 tons more than in 1955, when shipments had risen by almost 10,000 tons above the 1954 figure. The United Kingdom was Nigeria's best customer in 1956, taking 21,257 tons; the United States was next, with 6,299 tons; West Germany followed with 5,380 tons; while Czechoslovakia purchased 1,311 tons.

In Eastern Nigeria, negotiations are reportedly under way between the Eastern Development Corp. at Emugu and representatives of Dunlop Rubber Co., Ltd., on the possibility of establishing a tire factory locally. Such a factory is expected to cost £750,000. Nigeria now uses about 1.200,000 cycle tires a year, and an increase of 500,000 tires is looked for by 1960.

India

The National Industrial Development Corp. of India and the Firestone Tire & Rubber Co., Akron, O., U.S.A., are understood to be contemplating joint erection of a factory near Bombay to produce 20,000 tons of rubber annually. India's original plans for synthetic rubber manufacture had envisaged output of 10,000 tons a year.

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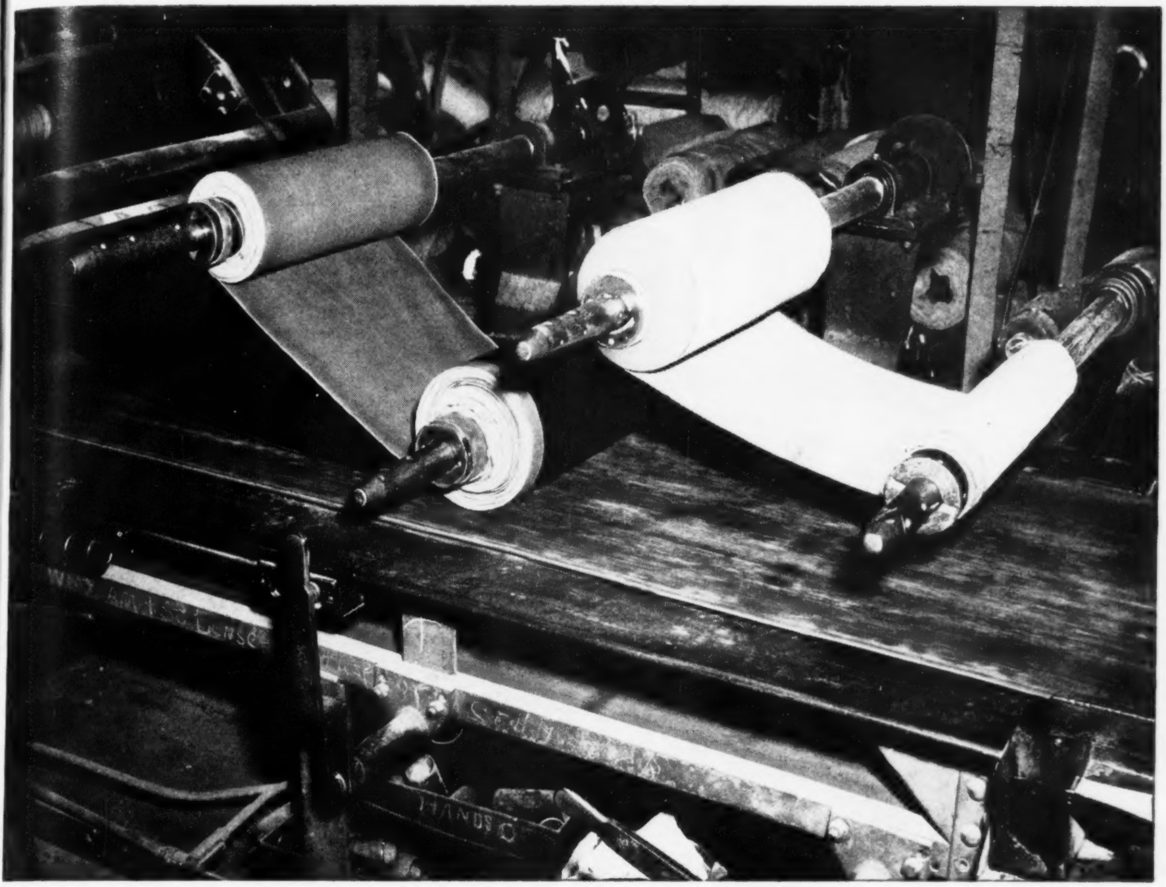

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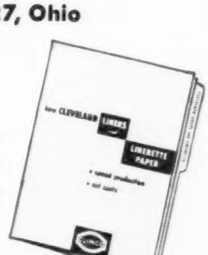

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